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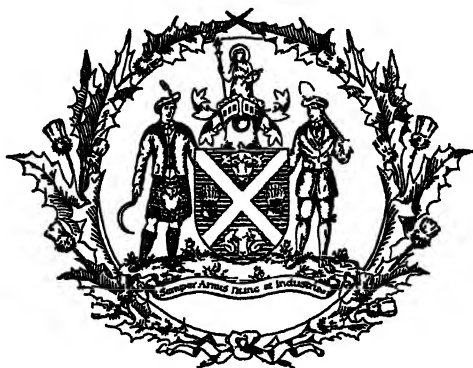
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SOCIETY OF SCOTLAND

WITH
AN ABSTRACT OF THE PROCEEDINGS AT BOARD AND GENERAL
MEETINGS, AND THE PREMIUMS OFFERED BY
THE SOCIETY IN 1945

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JOHN STIRTON,
Secretary.

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TRANSACTIONS
OF
THE HIGHLAND AND AGRICULTURAL
SOCIETY OF SCOTLAND

AGRICULTURAL EDUCATION IN AUSTRALIA:
WITH SOME LESSONS FOR OURSELVES.

By DR JOHN W. PATERSON,
Free Life Member.

I GLADLY accept the suggestion to write on this subject because some account of my experiences in Australia may help to clarify the outlook on agricultural education at home.

Outside our Agricultural Colleges in Scotland, which call for no criticism from me, this country appears to have no purposeful drive in agricultural education at the lower grades. And yet one must hope to see before long a definite and energetic development of the subject, especially in the secondary schools. Without such development Agriculture in this country will never become really science-minded. There is rather a long way to go.

Broadly speaking, it is not enough to have a few hundred men in the country who have been highly trained in the scientific principles of farming, while the great mass of people engaged in the industry have no grasp of its underlying sciences whatever. This hampers the efficiency of our scientific advisers in their life's work; it is of technical disadvantage to the agricultural industry; and it deprives both farmers and their men of much human interest in the duties of their common calling.

But let me be a little more concrete. In Scotland we have at work a number of first-class research stations—a summary of whose work is reported annually in the 'Transactions.' From these stations and from the Agricultural Colleges, from the Department of Agriculture, from business firms and other agencies there go out experienced lecturers to address farmers' meetings. Farming papers and other organs of the public press disseminate useful

information on scientific and technical problems. But does the seed from such well-meant efforts at instruction actually fall on well-cultivated ground? In too many cases it does not. And why? Because the average farmer never had any scientific background against which he could reason out for himself the conclusions or advice handed to him. If he accepts the experts' opinions, it is without any personal summing-up, because he is unable to grasp most of their implications and reservations. On the other hand, he may reject valuable advice simply because he cannot understand its gist.

A suitable education for future farmers and farm workers would enable the next generation to reap fuller benefit from lectures and scientific reports. But this is not the only gain; it is perhaps not even the most important. It would enable them also to understand Nature better, and to draw conclusions more accurately from observed results on their own farms. Even the children going home from school would begin to see for the first time with understanding eyes—crops, trees, animals, rain, unexpected finds by the wayside—object-lessons of part of their work at school.

In a recent address to teachers Earl de la Warr, of the Board of Education and previously of the Ministry of Agriculture, expressed the opinion :—

“While tariffs, subsidies, and marketing boards were important, let them not forget that the basis of all true agricultural reconstruction was the intelligent human being, and the maintenance of a rural culture which made a prosperous agriculture so valuable to the country as a whole.”

This opinion seems to gain strength. In December last Mr Butler (Minister of Education), in addressing the Essex Farmers' Union, said :—

“If agriculture is allowed to go, we all go together. Success will go to the country which has the most scientific approach to the problems of the land, and to the individual who takes most trouble to bring himself thoroughly up to date by training and study. The passing of the Education Act and the promised co-operation of the re-formed National Agricultural Advisory Service meant that they would expect many of the country senior schools to have a definite agricultural bias in their curriculum.”

Enough has been said on this matter. Mass education in agricultural science at lower grades has not only become desirable for the farming community; it has become essential.

And now for some account of agricultural education in Australia. But first let us have a few facts as general background.

The Australian Commonwealth is composed of six separate states, each with its own parliament and government departments to manage its local affairs. These include among other matters—education, land settlement, agriculture. In the all-Australia capital at Canberra there is also a Federal parliament to control affairs of common national concern, such as defence, foreign affairs, finance, customs, but purely local matters are left to the states themselves. Each of the states has also its own autonomous university, and five of them maintain chairs of agriculture. In the

universities the educational standards are at least equal to those of our own provincial universities, and in certain cases they are higher.

Each of the six states has its Department of Agriculture, and the organisation and activities of these for the improvement of local agriculture are very much alike. Each of them engages intensively in some branch of research work of special interest to itself, and also extensively in appropriate demonstration experiments for the benefit of the farmers round about. The latter are usually conducted on Government farms, of which each state has several, and are studied by crowds at the annual "field-days" when results are ripe. Each Department also issues a monthly journal of high technical excellence mostly written by its own staff. It also engages actively throughout the year in country lectures and practical demonstrations by its experts. All of the Departments also run well-equipped science laboratories of chemistry, botany, plant pathology, entomology, and veterinary science, to which farmers can send samples or specimens for examination and advice.

Each of the six states also has its Education Department with a director and an efficient subordinate staff. Every effort is made to provide schools even in most remote districts, but where pupils are fewer than eight, use is made of correspondence courses. The schools include both primary and secondary schools, at the latter of which candidates are prepared for the Junior and Leaving Certificates of the University. But of this—more anon. At all state schools attendance is free. In addition to state schools there are also (in the larger centres) a number of good privately owned schools ("public schools") usually attached to a religious denomination—fee-paying schools which take both boarders and day boys. In the various states the presbyterian school always calls itself "Scotch College," and all wear the same school colours. You can rely on the Scot abroad not to forget his native land.

And now we may go on to review the various types of agricultural education provided in Australia. Speaking generally, each of the states has established the same types of institution—viz., University; Agricultural Colleges and Farm Schools; Secondary Schools giving attention to agricultural science; and finally, Primary Schools giving instruction in Nature study. With their varying state controls some of those institutions have progressed further than their opposite numbers in adjoining states, but all are in existence and all have the same objectives. These include the ultimate improvement of agriculture and the development of an intellectually quickened rural population.

Each of the states provides a reasonably accurate replica of all the others. For the purpose of this article I shall refer specially to Western Australia because it is the best known to me. For that state it will be convenient to consider the organisation and treatment of the various grades of agricultural education, working downwards from the top.

THE UNIVERSITY AND AGRICULTURAL EDUCATION.

I went to Western Australia in 1913 as professor of agriculture, after serving some years in the Victorian Department of Agriculture as experimentalist and lecturer to their chemistry branch. At the university in Perth (W.A.) "agriculture" came under the faculty of science, and the ordinary degree was bachelor of science in agriculture—B.Sc.(Agric.). There were five departments of pure science in the faculty—mathematics, physics, chemistry, biology, geology. The first task was to draw up a curriculum for the degree in agriculture. The course involved three years of attendance at classes, and before entrance, candidates were required to pass the usual science matriculation. The subjects of the curriculum and the order of taking them were almost identical with those arranged over fifty years ago for Edinburgh by the late Professor Robert Wallace. His ideas for a university course in agriculture have since then been widely copied throughout the British Empire, and for this work alone he would deserve to be remembered. The division of studies throughout the course can be described generally as: First year—pure science; Second year—agricultural science; Third year—scientific agriculture. Advances in knowledge have been made since this curriculum was first planned, but the expediency of maintaining the old sequence of studies remains.

In Australia I made one change in the old curriculum so that it extended to four years instead of three. This was done by requiring that the undergraduate should cease attendance at classes after his second year in order to work for twelve months on a commercial farm. Under the Regulation he could not commence his final year at classes until he produced a certificate of efficiency from his farmer-employer, who had been approved for this purpose in advance. It was found that the one-year break in studies had an excellent effect both physically and mentally. The men seemed to grow up. The manual labour developed a better sense of proportion in the student and gave perspective to his book studies. In addition, and of set purpose, the student by work and observation of farming routine gained much valuable information of the kind which could never be obtained in class lectures.

Besides the ordinary degree course we had also a shorter diploma course lasting two years and with an easier entrance examination. It also had a lower pass standard in a smaller number of subjects. But here also the year of practical work was insisted on unless the student had worked long enough on a farm before coming up. Later on the holder of a diploma could, if he wished, convert into the degree by passing his matriculation subjects and attending a further two years at the university.

Of the graduates only about 20 per cent went later into farming, and usually these were the sons of large farmers. About 70 per cent went into Government service either in Western Australia or in one of the other states. A few entered private businesses ancillary to farming. To better equip some of the more talented graduates

than was possible with us they were encouraged to go abroad for post-graduate work, usually by the award of scholarships from the Faculty of Science. They went to different universities: for "dry-farming" to California; for sheep and wool to Leeds; for animal nutrition to The Rowett Institute, Aberdeen, and to Cambridge. Each of those students gained his doctor degree while abroad, and on return was readily absorbed into one of the services.

Even where local facilities are available it is usually an advantage (other things being equal) for post-graduate students to finish at another university which may also be in another country. The change has a broadening effect upon his outlook, and will generally render him a more versatile and progressive worker.

AGRICULTURAL COLLEGES OR SCHOOLS.

There were two such institutions in Western Australia: the Muresk Agricultural College near Northam, and the Narrogin School of Agriculture. Both had large farms, and Muresk was under the Department of Agriculture while Narrogin was run by the Education Department. They were both residential establishments and each had accommodation for about sixty boarders with class-rooms and a laboratory, together with necessary staff quarters. In addition to considerable areas under crop, both of them were well stocked with the usual farm animals.

I was familiar with both of them, being on the Council of Muresk, while Narrogin was frequently visited while passing, to give a lantern lecture to the boys and have a talk with the Principal. If these two institutions had any faults, the blame lay in the system and not in the management, for both were very ably staffed.

The senior college takes lads from sixteen years upwards, and the Narrogin school from fourteen years. In neither case is there any entrance examination and the fees are low. The course at Muresk covers three years; Narrogin two. In both institutions general science is taught at elementary grades in the first year, with interest concentrating upon its vocational applications during the final years of the course. Some attention is also given to general educational subjects such as English and mathematics. The class-work is sandwiched throughout the years of residence with alternate days, or with alternate weeks, devoted to field work or work with live stock, or it may be to technical exercises like blacksmithing or carpentry in the school workshops.

As external examiner in theory to the senior college, I formed the opinion that the sandwich system does not give good results. I was in a good position to judge. Each year it was also my work to examine many candidates from the ordinary secondary schools who were sitting for agricultural science at a very similar standard. This was done for the Public Examinations Board of the University, and the secondary schools were quite definitely better than the agricultural college candidates. They seemed to have a better understanding of the questions.

I do not think that the residential agricultural college system, as practised in Western Australia, is sound. It seems to have developed in response to a popular and perhaps not very well-informed public opinion. Its objective is to train highly young farmers in all branches of their future calling, and to do this under the best of possible conditions. We face the question of cost—and pass on. There is much of idealism in the concept, but it does not work out quite according to plan. So let us ask ourselves two questions: (1) Is there any better way of training young farmers than sending them to a residential farm college; and (2) If so, can better use be made of such colleges than is now being done?

In regard to the first question, it is generally conceded that young farmers should receive training both in the scientific basis of farming and in the practical work of the farm. He can receive both of these at the residential agricultural college. But as an alternative he could receive his agricultural science training at an ordinary secondary school, and then on leaving school he could go on a farm and work for wages. Of those two ways of training the young farmer I consider the second is the better as it is certainly much the cheaper.

As regards the science training, opinion has just been given in favour of the ordinary schools when discussing the sandwich system. As regards the practical training, preference must again be given to the ordinary farm rather than the residential college. There are a number of reasons. On the ordinary farm work must necessarily be run on business lines and for business reasons, and the young learner unconsciously imbibes the commercial atmosphere. He also develops habits of resourcefulness and the ability to use makeshifts. Nor on the ordinary farm is any loafing at work ever likely to be really popular.

As to our second question: the agricultural colleges in Australia would increase their efficiency and their output of students if they tightened up their entrance requirements from candidates for admission. Such requirements might well demand: (a) a School Leaving Certificate in agricultural science or in at least two of the pure sciences, (b) a certificate that the candidate had worked for twelve months on a farm after his sixteenth birthday. The agricultural college is not the place to teach elementary science; the ordinary schools can do it better and more cheaply. Nor is it the place to learn how to yoke up a cart or to thatch a stack—it is wasting college time and effort to demonstrate those things for students.

If those deductions are accepted, then there opens up an era of enhanced usefulness for the agricultural colleges. The regular students' course could be curtailed to one year instead of three, and the time could be fully occupied with lectures, laboratory work, and outside demonstrations. There would be no sandwich system in this one-year course. The lectures and tuition would be definitely practical in outlook and deal with systems of farm management and the technical applications of science to practice in spheres which lie beyond the capacity of ordinary schools. Unlike schools,

the work in agricultural colleges should be of such character that the average farmer would not feel bored if he accidentally dropped in.

And here I should like to make an important generalisation. In all the lower grades of agricultural education a clear distinction should be drawn between science training on the one hand and technical training on the other. If suitable arrangements are made at secondary schools in Scotland for teaching agricultural science up to a definite standard (see further on), then the difficulty of providing wider facilities for strictly technical training will be greatly simplified. The elementary science training falls to the Education Department, and the technical training to the Department of Agriculture. In dividing up this work as indicated, there need be no material overlapping of duties, and there should be independent executive controls. By such subdivision of work better educational facilities can be made available for greater numbers and at less cost.

With a simplification of their normal educational functions one can picture a number of other activities useful to the farming community which these farm colleges could undertake. They could hold specialised short courses for farmers of one or two weeks on, say, soils and fertilisers; drainage, irrigation, and lime; farm crops; animal nutrition; dairying; poultry farming; and other subjects that I am unable at the moment to set down. They could also carry out demonstration experiments with fertilisers; crop varieties; cultivation methods; and other problems bearing upon the farming practice of their neighbourhood. They could hold farmers' field-days once or twice a year to explain results of their work and just to show the neighbours how they are getting on. One agricultural college might also serve as a depot to illustrate new types of agricultural machinery, and on their own land demonstrate their working to farmers. Scotland wants for herself this useful form of accommodation. But I must refrain. There are so many avenues of real usefulness awaiting the entry of the agricultural colleges that one deprecates any futile activities in which, as a result of ill-conceived planning and organisation, they may at present be engaged.

SECONDARY SCHOOLS AND AGRICULTURAL SCIENCE.

Australia is well provided with secondary schools under a variety of names. These take pupils from the primary schools at about twelve and provide tuition, sometimes covering three years, in preparation for the Junior Certificate examination only; but more commonly they provide a five-year course preparing for the Leaving Certificate in addition. Most of the work falls upon the state Education Departments, and attendance at their schools is free. The numerous privately owned secondary schools ("public schools") do the same kind of work and charge fees.

The system under which a general secondary education is pro-

vided is much the same in all of the Australian states. A varying attention is given to agricultural education, but for details here we shall confine ourselves as usual to Western Australia.

Soon after going there I realised that the two farm schools or colleges could never accommodate the great mass of young people for whom an agricultural education was desirable. The two farm schools were costly to run and it was not proposed to increase their number. Yet something had to be done—something less costly and more convenient locally—if the benefits of agricultural education were to be shared by all the people who wanted it.

The University provided a solution. It had already in operation a Board of Public Examinations which each year offered examinations to schools in all the ordinary subjects taught—English, history, languages, sciences, drawing, and many others. These examinations were held at prearranged dates and centres all over the state, and it was decided to add “agricultural science” to the list of subjects. This was done both at the Junior and Leaving grades.

The Board was composed of representatives of the University, of the state Education Department, and of the privately owned Public Schools. Administration was in the hands of the University, which appointed examiners, made all local arrangements, and finally issued certificates to successful candidates. As Vice-Chancellor of the University for several years I was also *ex-officio* Chairman of the Board for the same period and gained an intimate knowledge of its work.

Inclusion of agricultural science in the scheme was warmly welcomed by the state Departments of Education and Agriculture. The burden of added work fell on the former, and it gave us most loyal support. The reason was, I think, that they understood our purpose. *They were not expected to teach Agriculture but to teach Science.* The commonplace facts of agriculture were to be used only as the background to a clear-cut course in general science. Agriculture is well suited for this purpose because most of the pure sciences have a bearing upon farming pursuits, and there seems no reason why students at our secondary schools should not receive their mental training from the study of agricultural science as well as, say, from biology, or from physics plus chemistry. Educationally and when properly handled it is as good as any of them, while the frankly utilitarian purpose implied in its lessons broadens the outlook of its students and keeps its science alive. And it carries in addition two public advantages of no mean order. If the pupil subsequently takes up farming in any capacity, the course will be of definite vocational value to him and increase his interest in the work. If, on the other hand, he never becomes connected with farming after leaving school, the course will still be of cultural value to him and improve his comprehension of everyday happenings. And generally, and on the broadest basis, the adoption of “agricultural science” under its own name in schools will tend to augment the public respect for rural life which is so often lacking.

Agricultural science was to be treated as a science, and the Education Department adopted it. Pottering about with rakes

and hoes in the school garden in the sacred name of "Education" was discouraged as a waste of valuable time. It was preferred that time spared from oral instruction should be used rather in the science laboratory performing experiments relevant to the syllabus. Pupils had to keep record of work done there in their laboratory notebooks. Under the regulations of the Examinations Board, candidates for the certificate in Agricultural Science were required to submit these notebooks countersigned by their head-teacher at the time of the written examinations. There was a similar requirement in all other science courses.

As with other subjects of examination under the Board, a syllabus defining the work to be covered in agricultural science had to be drafted both at Junior and at Leaving grade. The subject in itself covers an extremely wide field and it is therefore the more necessary to define, and thereby to limit, the work to be prepared for the examinations. (This is equally true for the pure sciences, but conventional school practice may let us forget it.) The topics in the examination syllabus must therefore be carefully selected, keeping in view: (1) their fundamental importance; (2) the avoidance of second-rate detail; (3) the purpose to present a broad field of study to the pupil. For schools the "why" and not the "how" of agriculture should form the basis in teaching and the centre-point in examinations. Without a syllabus drafted on those lines much school time could be wasted on trivial details, and on occasion perhaps in discussing farming operations which in fact can be learnt only in performing the jobs.

In order to deal with this important subject in more concrete form it may be useful to reproduce the syllabus for Agricultural Science at Junior grade as it was adopted by the Examinations Board. In doing this I have altered here only the section dealing with "Crops"—and this because of our different climatic conditions.

SYLLABUS FOR AGRICULTURAL SCIENCE.

(Junior Certificate Examination.)

The Plant.—General characters of roots, stems and leaves, with their modifications and uses. Carbon assimilation. Water requirements. The essential food-materials. How crops feed.

The Atmosphere.—The barometer. Chief constituents. Nature of combustion and respiration.

Soils.—Methods of formation. Distinctive characters of sand and clay in relation to soil moisture. The active and dormant food-materials. Nitrification, denitrification, and humus.

Manures.—Why required. Origin and description of the principal phosphatic manures. Potash. Manures supplying nitrogen and their rates of action. Unit system of valuation. Loss of manures from the soil. Different forms of lime.

Soil Improvement.—Objects of ploughing, harrowing, cultivating, weeding, and rolling. Benefits of fallowing and green manuring. Reasons for draining and liming, with a general knowledge of methods. Nitrogen fixation by leguminous plants.

Crops.—Names of principal farm crops of Great Britain, and the purposes for which grown. Vegetative characters. General principles affecting the seeding, cultivation, and harvesting of farm crops. Causes of crop failure.

The Animal.—Difference between plant and animal food requirements. Uses of starch, fats, and proteins. Digestion, absorption, and assimilation of food. Feeding for maintenance. Feeding for profit.

The Dairy.—Average composition of milk. Nature of the several constituents. Changes on keeping milk. The cream separator. Butter. Cheese.

The more advanced Leaving Syllabus on similar lines is omitted here for reasons of space.

In Western Australia about forty schools were sending up candidates at the time I demitted office, and the number had been steadily increasing over about twenty years. The largest entries came from the fully equipped secondary schools in the important farming centres of Bunbury, Albany, Narrogin, Northam, Moora, and Geraldton, but Perth (the capital) and Kalgoorlie (gold mining) also sent in large numbers. Most of the "Public" schools sent their quota, and candidates came in twos and threes even from remote primary schools where the subject had become a hobby with the head-teacher.

And now a word about preparing teachers. Agricultural science is not a new science but only the application of new science to an old industry. In good secondary schools there is always a science master on the staff, and in Australia these found no difficulty in tackling the new syllabus with their own science training and the use of a small book called 'Nature in Farming.' This I had prepared in advance of the syllabuses, and it has since gone through four editions. It is now used in all the agricultural colleges and secondary schools doing this work in Australia and to a large extent in New Zealand. It is best in the hands of a trained science master, but it has also been used by others as well. The Education Department approved of this book, and the subject had been taught in their schools for several years before attention was given to the formal training of teachers. After that, however, Agricultural Science became included as a subject at the annual Teachers' Examinations of the Education Department, and passes gained by teachers were recorded to their credit in the usual way. These departmental examinations were subsequently of help, but the late date at which they were introduced proved that they had not been considered essential before making a start. In an old country—sometimes tied by tradition—such sequence of events in the training of teachers might appear unorthodox and unthinkable. But it worked.

And now it may be useful to reprint one of the Junior examination papers taken at random. It will perhaps indicate still more clearly than the syllabus the kind of teaching it was desired to give. Readers can judge whether the answers to those questions embody the kind of knowledge they would like in their boys if leaving school at fifteen. To save space we omit a specimen paper at the Leaving grade.

JUNIOR CERTIFICATE EXAMINATION.

AGRICULTURAL SCIENCE.

MONDAY, 3RD DECEMBER 1934—9.30 A.M. TO 12 NOON.

(Only SEVEN questions to be attempted.)

1. Mention five differences between the foliage leaf of wheat and clover. Describe—(a) the structure, (b) three functions of the stomata. What do you know of the character and formation of chlorophyll?

2. Mention two experiments proving that the atmosphere exerts pressure. Name four important constituents of air, and indicate for each—(a) the percentage present, (b) its use to crop plants, (c) any one source of it in air.

3. Name three principal classes of rocks, and mention (only) any six weathering agents whereby soils are formed from rocks. Explain the following terms with reference to soils—(a) sedentary, (b) heavy, (c) loam, (d) hard pan, (e) mechanical analysis.

4. How would you estimate the respective percentages of—(a) moisture, (b) organic matter, (c) mineral matter, in a soil? If a soil contains 3.45 per cent organic matter, and weighs 96 lb. per cubic foot, calculate to *tons* the weight of organic matter per acre to a depth of 9 inches.

5. Name—(a) three commercial fertilisers supplying nitrogen, (b) three supplying phosphoric acid, (c) three supplying potash. Calculate the percentage of potash (K_2O) in sulphate of potash of 90 per cent purity.

[O = 16; S = 32; K = 39.]

6. Name seven essential food-materials of crops which are drawn from the soil. Write brief explanatory notes on—(a) law of the minimum, (b) law of diminishing returns, as affecting the use of fertilisers. What happens to unused superphosphate within the soil?

7. Name three leguminous crops. Explain—(a) the formation of root nodules, (b) the use of these to the crop, (c) two reasons why nodules may be absent or scanty, (d) why a leguminous crop may benefit a wheat crop following. Suggest a reason why peas contain more protein than wheat.

8. Explain the following terms in animal nutrition—(a) hæmoglobin, (b) carbohydrate, (c) enzyme, (d) digestion coefficient, (e) albuminoid ratio. Why do fodder crops become less valuable as ripening proceeds?

9. In what physical condition is fat present in fresh milk? Explain how the specific gravity of fresh milk would be changed by—(a) cooling, (b) separating out the fat, (c) diluting with water. How is the fat separated from the milk in cheese-making?

The general design was to elicit reasoning power and intelligence rather than memory—subject to the reservation that in order to reason one must remember necessary basic facts. For that particular question paper I find that 75 per cent of the candidates passed. For all years the average percentage of passes was 79.8 for Leaving and 70.2 for Junior candidates. A Distinction pass was available at the Leaving but not at the Junior standard. The average age of Junior candidates was about fifteen, and of Leaving two years

more ; the actual age of individual candidates would vary about one year up or down from the average. Spreading their attention to Agricultural Science among other school subjects, the larger schools in Western Australia commonly allowed three years for preparation of Junior candidates, and five years for the Leaving ; this would normally mean that preparation for the Junior started at twelve. Specimens of candidates' worked papers at each grade, and which I had preserved, are lying in Edinburgh with the Education Department.

In the University of Western Australia a pass in Agricultural Science at Leaving standard is counted as a subject for matriculation in the Faculties of Arts, Law, Science, and Engineering. There is no Faculty of Medicine.

AGRICULTURAL EDUCATION IN SECONDARY SCHOOLS IN SCOTLAND.

It will now be appropriate to set down some information as to what is being done to promote agricultural education in Scotland at a secondary school standard. For this purpose I visited the Education Department in Edinburgh, where I was courteously received and given such information and printed matter as was considered relevant. We shall now consider this.

The Scottish Department grants certificates of proficiency in general school subjects at two grades, termed respectively the "Junior Leaving" and the "Senior Leaving." These correspond roughly to the Junior and Leaving certificates of Western Australia, and as with them the lower certificate requires three years of preparation, and the higher certificate five years at a secondary school. In Scotland, however, Agriculture does not seem to receive any systematic attention at either grade, and the provision made for it might be described as "casual."

For the Junior Leaving certificate in general there are no set examinations—certificates simply being awarded by H.M. Inspectors, who are instructed to "give considerable weight to the opinion of the head-teacher." Candidates must be presented in at least four subjects, or groups of subjects ; in the case of groups a choice must be made. Rural Courses appears as a fifth option in the largest group of general courses and is prescribed in these words : "In Rural Courses an approved group drawn from the following subjects—rural science, gardening, agriculture, dairying, poultry-keeping, benchwork." Agriculture is thus only an option within a group which is itself an option within a larger group. And what does the Department mean by "Agriculture" anyway ? There is no attempt to limit or define the scope of agricultural instruction ; that is left to the discretion of the local authority or headmaster. A Junior Leaving certificate covering attainment in Agriculture must have a very uncertain value indeed. In my opinion the scheme is too vague and indefinite to accomplish anything really worth while.

And now for the Senior Leaving certificate. Here written examinations are held in all the principal school subjects, and passes are awarded upon these, while consideration is also given to "teachers' estimates of candidates." Oral and practical tests are also given, and from candidates in sciences their laboratory notebooks must also be available. For the certificate, candidates must present themselves in not less than five subjects, which in Circular 62 (1939) are set out in four columns or lists. In Column II. of those subjects we find—Mathematics, four Sciences, and Engineering. For those six a written examination is provided. Engineering stands in good company. But Agriculture is treated less respectfully; it appears only in Column IV. sandwiched between Domestic Subjects and Art, and no common examination is noted for this Cinderella. Nor does Senior Agriculture in the secondary schools seem to be honoured with any kind of syllabus or suggestions to teachers for ensuring a well-balanced course. In Circular 30 (1939), which also deals with this examination, there appear sixteen closely printed pages of an Appendix giving syllabuses and suggestions for all the important subjects—including Engineering; but no attention of this kind is paid to Agriculture. One wonders whether that would have been too difficult; or if it was just not worth while. What is the scope of agricultural science teaching under the Scottish Education Department? And what is the value of a pass in Agriculture at the Senior Leaving Examination? Unlike in Australia, the Scottish Universities Entrance Board will have none of it. But as the Department is still probably only feeling its way, it is better to say no more.

Agricultural Science as a school subject will never make solid progress until one definite syllabus of instruction is recommended both at Junior and Senior grades. This is already done for Physics, Botany, and other sciences dealt with in the Appendix quoted. And the same should be done for Agricultural Science. The area of Scotland is too small and its diversities of climate too inconsiderable to render a different one necessary for different parts of the country. The subject in schools can be graded up only by presenting all rural areas with a single clearly defined programme of work. The form which tuition should take is too vital to be left to the opinion (or caprice) of local opinion, which may neither be very well-informed nor appreciative of the needs of the rising generation of farmers.¹

A definite syllabus for Agricultural Science is the first necessary step towards improvement. The next step is to begin teaching in the schools, and actually this can proceed without any elaborate procedure in the preliminary training of teachers. Science teachers in Australia were able to meet all the demands of their syllabus by using the text, 'Nature in Farming.' They said they liked the subject. For similar use by teachers and pupils in this country much of the text has been rewritten and the new book published

¹ The new Education Act (1944) for England removes this danger by conferring certain useful powers of direction upon the Central Authority. In the new Scottish Act no similar agreement for control was reached, but with goodwill and the English example before us the position can now be regarded as more favourable.

under the name 'Science in Agriculture' (Longmans, Green, London). It is not pleasant to recommend one's own book even to enable a start with agricultural science in schools, but experience in Australia must be warrant for such self-assurance. I made an offer to the Department (which stands) to renounce any financial gain which might accrue from its use in their schools.

By using its science teachers an immediate start can be made with agricultural science in schools. Teachers and supervisory staffs would meantime be gaining experience while good work was being done in the rural areas. Concurrently a beginning could be made with the formal training of teachers. During the early years the certificate examinations should be kept somewhat easier until the subject has attained its full educational stride.

PRIMARY SCHOOLS.

Western Australia was well equipped here, and as usual the chief preoccupation was inculcation of the three R's. The usual ages were six to twelve—working up after a start from Standard I. to VI. Many of the schools gave time to Nature Study, and my friend Mr Hamilton was in charge for the State Department. For the guidance of teachers he prepared a useful little manual for the most part describing easy class-room experiments and employing the most simple of apparatus. The lessons had an agricultural bias centring largely round soils, fertilisers, plant structure, feeding of plants, and a few elementary facts in animal nutrition; he avoided spiders and orchids. The complete course was embodied in ninety-six lessons, and these were divided into three sections—A, B, and C. In small schools only one section was taken each year, and with thirty-two lessons in a section this provided one school period per week during the session. It did not signify in what order sections were taken, so small schools could take Standards IV. to VI. as one class, and where a boy had started in Standard IV. at ten, say in section B, he had got round the clock in Standard VI. at twelve. The work was very good.

In Scotland this work could be carried on in primary schools, and I have copies of the literature just referred to. But with the raising of the school-leaving age perhaps less time than before should be allocated to Nature Study so as to leave more time for the fundamental subjects of a primary education. Where pupils are going on later to a secondary school they can there do similar work at a higher standard, with better equipment, and at an age better fitted to realise the import of the lessons. It is not implied that the subject in primary schools should be omitted altogether, but instead of a three-year course the work could be restricted to the final year. This might not carry pupils very far, but it would give them to realise that there were other and new fields of study in which interesting work could be done later on.

CONCLUSION.

And now we come to a close. Agricultural education in Western Australia has been described at various grades from the University down to the primary school. It is hoped the criticisms which have been passed may afford some clues for improving the organisation in Scotland. It is unnecessary to recapitulate all our findings, but their main features as affecting Scotland may perhaps be usefully summarised :—

1. There has been much vague talk about agricultural education. In planning for its improvement at lower grades a clear line should be drawn between scientific and technical training.

2. The former should be the responsibility of the Education Department, and the latter of the Department of Agriculture. Within the different spheres there should be no divided responsibility, and no overlapping of executive controls.

3. The routine practical work of the farm can be learnt best, and without cost, by working for wages on an ordinary commercial farm holding.

4. On residential farm schools and colleges expenditure may be altogether extravagant and wasteful unless suitable entrance qualifications are demanded from candidates for admission.

5. Our rural districts require mass education in the scientific principles underlying agriculture.

6. This education can be most efficiently supplied through the agency of the secondary schools.

7. In such schools Agriculture should be treated as a science of general educational value, and no attempt should be made to deal with the technical operations of farming.

8. To ensure a wise expenditure of effort it is essential that one definite syllabus of instruction in agricultural science be recommended for all schools—one at the Junior and one at the Senior grade. An example of a Junior syllabus has been given.

9. Only when Agricultural Science in schools has achieved definite scope and form can certificates of competence issued by the Department for this subject acquire any recognisable value.

10. Secondary school teaching can begin at appropriate centres as soon as subject syllabuses have been agreed upon, and without waiting for any formal training of teachers. The training of further teachers should, however, proceed concurrently.

11. With the raising of school-leaving age, primary school courses in Nature Study may be curtailed but not necessarily eliminated.

12. Against the coming competition in agricultural production throughout the world the best defence is an intelligent and well-informed community in the rural areas of our own land.

ABORTION IN CATTLE AND SHEEP.

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INTRODUCTION.

It is difficult to give an exact and concise definition of the term "abortion." Some writers have limited the term to indicate a birth taking place during the first two-thirds of pregnancy, during which time the foetus is incompletely developed and not capable of living on its own, and talk of "premature labour" to indicate birth during the later stages of pregnancy, where the young animal is frequently living, though small and weakly. When considering any disease process involving the womb, the membranes, or the foetus, it seems preferable, however, to use the term "abortion" in its widest sense, to denote any premature birth, whether or not the foetus is dead when delivered. Other terms which have been used for interruption of pregnancy are "slinking," "slipping," "warping," "casting" and "picking," and (in sheep) "kebbing."

HISTORY.

The science of bacteriology in relation to disease is comparatively young. The first recognition of bacteria came at the end of the seventeenth century and was made possible by the earlier discovery of the microscope. Just over one hundred years ago Henle put forward the idea that the cause of contagious or infectious disease must be looked for in minute living organisms or fungi, but the actual discovery and description of various organisms and the proofs of their relationships with various diseases did not come until the last quarter of the nineteenth century. The discovery of the organism which causes contagious abortion in cattle was not made until 1897; since then other organisms have been found associated with abortion; these will be discussed later.

It is interesting to turn back for a moment and consider what were the prevalent ideas as to the causes of abortion before the work of scientists focussed attention on bacteria.

Yonatt (1834) reported that abortion in cattle was "sometimes singularly frequent in particular districts or on particular farms." This author did not believe abortion to be contagious as did some of his contemporaries, but regarded it as due to the "imaginative disposition" of the cow which was "highly irritable" during pregnancy. Following an abortion the other cows were said to sniff at the putrid discharge and then run bellowing about. "Some

sympathetic influence is produced on their uterine organs, and in a few days a greater or less number of those that had pastured together likewise abort." Youatt advocated the rapid removal of the aborted foetus and its burial as far as possible from the cow pasture, together with the smearing of the genital organs of the cow with tar or stinking oils in order to "conceal or subdue the smell." He also regarded it as advisable to fatten and sell the offending cow. Other supposed causes of cattle abortion mentioned by Youatt are: violence, too high condition of the cow, inflammation of the bowels following feeding on grass covered with hoar-frost, feeding on coarse, rank herbage in low marshy and woody country, drinking of water with a high iron-content, tuberculosis, and "hoven." He also mentions cases where whole herds of cows aborted after being terrified by an unusually violent thunderstorm. Youatt finally remarks: "Besides these tangible causes of abortion there is the mysterious agency of the atmosphere. There are certain seasons when abortion is strangely frequent and fatal; while at other times it in a manner disappears for several successive years."

It is quite evident from many of this author's remarks that contagious abortion, as we know it to-day, was quite commonly experienced in those times. We may be inclined to smile a little at these old theories of "sympathy" and smell and the "mysterious agency of the atmosphere," but it is as well to remember that even in these days there are still many people who believe in the billy-goat as a preventive for abortion.

Speaking of abortion in ewes, Youatt gives the following causes: (i) starvation—especially when a cold winter succeeds a wet summer and autumn; (ii) continued intercourse with the ram after gestation is considerably advanced; (iii) hasty driving of sheep in later period of pregnancy; (iv) leaping over a ditch or low gate or a sudden fright as by a dog addicted to sheep worrying; (v) too liberal use of salt. This author reported that the ewe was not so subject to abortion as the cow and that the affection did not spread so rapidly through a flock as through a herd of dairy cows.

In 1872 there was published in the 'Transactions' an interesting article by George Armitage, M.R.C.V.S., entitled "Abortion and Premature Labour in Mares, Cows, and Ewes." This author classified the causes of abortion as (a) vital and (b) mechanical. The "vital causes" were said to be excited "through the function of nutrition of the foetus"—interference with the blood supply to the foetus led to imperfect development and eventually to the death of the foetus which was then a "foreign body" and was expelled from the womb. Under this head he mentioned abortion occurring when cows were infected with foot-and-mouth disease or pleuropneumonia, abortion following administration of some medicines, abortion in animals under conditions of starvation and under conditions of "plethora." At that time many acute and fatal diseases, such as anthrax, blackleg, and braxy, were thought to be due to a state of "unnatural plethora," and it was argued that the increased nervous sensibility in pregnancy admitted of fatal

results to the foetus from states of plethora less intense than those which would produce the fatal diseases mentioned.

Armitage described the inflammatory changes occurring in the placenta leading to the death and final expulsion of the foetus.

Mechanical causes were said to consist chiefly of the influences of violent force applied more or less direct to the womb. For cows the list of this type of cause includes "hoven," various forms of indigestion, interference by half-castrated males or continuously bulling cows, while fright is mentioned as a not infrequent cause of abortion in cows and ewes.

Abortion in sheep is discussed by Hugh Borthwick in an article in the 'Transactions' in 1873. He considered that the condition was not infectious but that it spread through a flock simply because all the sheep had been subjected to the same mismanagement. He ascribed most of the severe outbreaks of abortion to the ewes being stinted in their food through the autumn and winter, and deprecated the practice of confining pregnant ewes on turnips without provision of other fodder.

In 1887 Dr G. Sims Woodhead, Professor M'Fadyean, and Dr A. P. Aitken conducted an inquiry into the causes of abortion in cows, and their report is published in the 'Transactions' for that year. They confine their discussion to the causes of actual outbreaks of abortion, while admitting that occasional sporadic cases of abortion may be due to causes such as mechanical injury and fright.

Discussing the various theories of the cause of epizootic abortion, these authors inclined to the view that the act of abortion was in many cases the result of a disease which could be transmitted from an affected cow to a healthy one. They pointed out that no real evidence had been produced in favour of the theory of "sympathy," and that, while it was not possible to deny that errors in feeding or ergoted grasses might be capable of causing abortion, there was no reliable evidence to show that either of these causes did in fact operate. The theory of contagion, on the other hand, was one which could easily be subjected to experimental investigation, and the report concludes by outlining the type of investigations which were then being carried out.

Since that time research on contagious bovine abortion has been carried on all over the world, and the literature dealing with the subject is remarkably extensive. We are able at the present time to exercise a considerable and useful degree of control over this destructive disease, but its complete eradication still seems to be a dream of the future and a problem which present-day methods seem unlikely to solve.

PHYSIOLOGY OF REPRODUCTION.

Before reviewing our knowledge regarding the various types of abortion in cattle and sheep, it is proposed to summarise briefly the main features of the natural processes which occur in an animal from the time of service up to the birth of the young animal.

The female reproductive organs consist of the two ovaries, the oviducts or "fallopian tubes," the "uterus" or womb, and the vagina. The ovary is a dual-purpose organ. First of all its function is to produce the "ovum" or egg, which must be fertilised by the male sperm before it can develop into the young animal. This ovum has to pass into the womb and there be nourished, and certain changes are necessary in the womb before this can come about; these changes are controlled by the action of chemical messengers or "hormones" which are produced by the ovary itself. The ovary thus has a second function—to bring about the adjustment of the other reproductive organs so that they can receive the ova and carry them through to birth.

The oviducts are fine tubes, one on each side, which carry the ova from the ovaries. They connect directly with the two "horns" of the uterus which join together to form the "body" of the womb. In the cow and the ewe the body of the uterus is quite short; it connects with a muscular neck or "cervix" which opens into the vagina by a small orifice—the "os uteri."

The ovum develops inside a structure known as the "ovarian follicle," which looks rather like a blister on the surface of the ovary. The follicle contains fluid under pressure, and it ripens and then bursts; this occurs at the time when the animal is "on heat." The ovum is washed out of the cavity by the escaping fluid and finds its way into the oviduct. If service has not taken place this ovum dies and the reproductive organs undergo a cycle of changes leading round to the ripening of another follicle and another "heat" period. In the cavity left when a follicle has ruptured a small gland develops; this is called the "corpus luteum," a structure which has very important functions. It prevents the ripening of further follicles, is concerned with the implantation of the fertilised egg in the womb, and is connected also with the development of the udder. If the egg has not been fertilised this corpus luteum is gradually absorbed, and then further follicles ripen and the whole cycle starts again. If service has taken place, however, and the male sperm has found its way up into the oviduct and fertilised the ovum, then the corpus luteum does not disappear. On the contrary, it usually remains fully developed throughout the whole period of pregnancy and is essential for the development of the wall of the uterus and early nourishment of the embryo. In its early stages of development the ovum is thought to be nourished by the fluid which is present in the cavity of the womb, but after a time the embryo develops its own blood circulation. Blood-vessels run through the membranes surrounding the embryo, and these membranes are attached by the "cotyledons" to the similar button-like structures on the wall of the womb. The attachment is so close that in this region there is only a thin layer of tissue between the blood circulation of the mother and that of the foetus. The foetus is thus nourished and the waste products removed by interchange between the two blood circulations, and this process goes on until the foetus is fully developed and birth takes place. The exact nature of the processes which bring about the birth itself

is still unknown, though various theories have been advanced. It is known, for instance, that the pituitary—a small gland at the base of the brain—produces a hormone which will stimulate the uterine muscle to contract. It is also known that while the corpus luteum is functioning this muscle is much less sensitive to the action of pituitary hormone, and it is therefore suggested that when the corpus luteum degenerates at the end of pregnancy this hormone is given a chance to get to work, and it stimulates the uterus to contract and birth takes place. There are, however, many complicating factors, and it will probably be a long time before the scientist succeeds in unravelling all the threads in this very complex problem. The whole process of reproduction from first to last is apparently controlled by the interaction of these wonderfully potent “hormones”—some produced by the ovaries, some by the pituitary gland, and some by the placental membranes surrounding the foetus. We know something about some of these and about their various actions, but it is more than likely that there are others whose existence has not yet been discovered. With such a complex and delicately balanced process as this it is hardly to be wondered at that from time to time some upset occurs and abortion takes place.

THE CAUSES OF ABORTION.

(a) *Infectious Abortion.*—In infectious types of abortion the organisms multiply in the womb and cause death of the delicate tissues of the membranes surrounding the foetus. There is a separation of the foetal and maternal cotyledons, and the foetus may die through lack of nourishment and then be aborted. If the disease process occurs later in pregnancy and is not too extensive, the young animal may be alive when abortion takes place and may survive.

Several different kinds of bacteria have been incriminated as causes of abortion in cattle, but the diseased placenta looks very much the same whichever germ is the cause. Many of the cotyledons are a dirty greyish-yellow colour, and there is a yellowish or chocolate-coloured discharge.

(b) *Abortion occurring in the Course of Infectious Diseases.*—Abortion may occur when a pregnant animal is acutely ill from another disease. A high abortion rate is seen, for example, in herds and flocks affected with epizootics of highly infectious diseases like foot-and-mouth disease, rinderpest, and sheep-pox. There is not necessarily any disease of the reproductive organs themselves, but the severe systemic disturbance is enough to bring about abortion.

(c) *Abortion due to Faulty Nutrition. The Effect of Minerals and Vitamins.*—On theoretical grounds it seems likely that faulty nutrition of the mother might lead to abortion, but it is usually difficult to prove that a particular nutritional factor is in fact responsible for the abortions observed. In the article already quoted, Hugh Berthwick ascribed many severe outbreaks of abor-

tion in sheep to the practice of confining ewes exclusively on turnips without provision of other fodder. This is certainly a method of feeding which has little to commend it, and it is rarely practised now, but it would be difficult to prove that it did in itself cause severe outbreaks of abortion. It would be necessary to rule out all other possible causes, including infection, before concluding that this method of management was the actual cause of abortion. Extreme poverty in sheep may lead to abortion, and in hill flocks an occasional "piner" may abort. It is, however, surprising that the mother can often live under conditions of severe malnutrition and maintain her foetus at the expense of herself. In areas where there is a severe phosphorus deficiency, for instance, there is always a small calf crop and a small lamb crop, but this is not due to abortion but simply to failure to conceive. Those animals which do conceive carry their young to full time though suffering themselves from acute phosphorus deficiency. Deficiency of vitamin A, on the other hand, as it occurs in several areas in the U.S.A., is apparently associated with a high abortion rate in cattle. Under conditions of severe vitamin A deficiency the pregnant cow may abort or, if the calf is carried to full time, it is born very weak and rarely survives for long. It is doubtful, however, if vitamin A deficiency occurs in this country in such an extreme form as to produce actual abortion.

In some areas of Australia a wasting disease of cattle and sheep known as "enzootic marasmus" has been shown to be due to cobalt deficiency. In the course of this disease pregnant cows not infrequently abort. As far as this country is concerned, however, there is as yet no reliable evidence that cobalt deficiency may be associated with abortion in either cattle or sheep.

(d) *Abortion due to Mechanical Causes—Accidents, &c.*—There is little doubt that accidents may lead to internal injury to the foetus or its attachments to the mother and result in abortion, but it is probable that many cases of abortion ascribed to accidents are in fact due to other causes. The first two or three cases in an outbreak of contagious abortion are, more often than not, put down to accidents. An accident can usually be remembered to account for each particular abortion, and it is only when more abortions occur that the farmer begins to think that there may be contagious disease present. It is a widely accepted view that abortion in sheep can occur as a result of the activity of a dog addicted to sheep-worrying; in more recent times the aeroplane has frequently been blamed, though probably with little justification. Deep snow or very muddy conditions on the turnip break have also been blamed as causes of abortion in sheep.

(e) *Abortion resulting from Inbreeding.*—Observers in America have noted a very high abortion rate in heifers mated with their sires, and those calves which were produced were subnormal and had a high mortality.

(f) *Abortion due to Disturbance of the Endocrine Glands.*—It would not be surprising if, in nature, breakdown occasionally occurred in the complex mechanism controlling pregnancy and

parturition, with abortion as the result. We know, for instance, that the presence of the corpus luteum in the ovary is essential for the continuance of pregnancy, at least for the greater part of the gestation period, and it is possible to produce abortion at will by expressing the corpus luteum manually *per rectum*.

However, we know only the framework of the complex system of control, and a great deal of research will have to be done before we can fill in all the details. Until we know more about the endocrine control of reproduction we can only surmise that environmental conditions may occasionally cause an upset in the balance of the controlling mechanisms and abortion may result. In human medicine some success has attended thyroid treatment of subjects liable to abortion, while the corpus luteum hormone has also been used with success in treatment of threatened abortion.

(g) *Poisoning*.—There was at one time a popular belief that cows grazing in fields containing ergotised grasses aborted their calves, and the same cause has been suggested for some outbreaks of sheep abortion. Experimenters have, however, failed to bring about abortion by feeding quantities of ergot to sheep and cows.

ABORTION IN CATTLE.

The causes of a fairly large proportion of abortions in cattle are known, but there still remain many unexplained cases of "non-specific" abortion. Perhaps the causes for some of these may be nutritional or mechanical or due to some unexplained upset in endocrine control. More research is necessary to determine these causes.

In the following sections abortion due to known causes will be discussed. The chief of these, of course, is contagious abortion due to *Brucella abortus*. Of hardly less importance is the disease known as *Trichomoniasis*, which includes abortion amongst its characteristics. Other causes of abortion are dealt with more briefly.

1. *Brucellosis. Contagious Bovine Abortion. Bang's Disease.*

(i) *Introduction*.—Contagious abortion in cows has been known for a very long time. Its cause, an organism known as *Brucella abortus*, was discovered by Bang in 1897, and since that time research has told us a good deal about the disease, the way it is spread, how the invading germs spread in the body, and its effect on the breeding efficiency of a herd. The names "Bang's Disease" or "Brucellosis" are to be preferred to the name "Contagious Bovine Abortion," since abortion is by no means the only symptom of the disease and there exist many infected animals which do not themselves abort. In this country, however, the disease is usually referred to as "Contagious Abortion."

The work done on this disease has given us various methods of control, but complete eradication seems to be as far away as ever.

This disease is one of the most serious bovine diseases ; it not only causes a great loss in calves and in diminished milk supply, but in some outbreaks it interferes with breeding and many cows have to be drafted out of the herd on account of sterility.

Various estimates of the general incidence of the disease have been made from time to time. The ' Report on Diseases of Farm Stock,' prepared by the Survey Committee of the National Veterinary Medical Association, estimates abortions and premature calvings caused by Bang's disease at 10 per cent of all pregnancies. Another authority suggests that 15 to 20 per cent of all cows in the country are infected. Whilst it is true that there are no very accurate records from which estimates of incidence can be prepared, experience suggests that the annual wastage due to this disease must be tremendous. To the nation the loss is extremely serious, but to the individual farmer whose herd suffers an " abortion storm " the loss may be wellnigh crippling.

Apart altogether from the loss it causes to the farming community, this disease is of importance in public health. Some 400 to 500 cases of undulant fever occurring annually in this country are attributed to infection with *Brucella abortus*, and it is probable that in the majority of these the infection was gained by the consumption of raw milk.

(ii) *How the Disease spreads.*—It is not generally realised by farmers that the cow usually becomes infected by taking in the live germs through the mouth and that the bull is of little or no importance in the spread of the disease. It has frequently been shown that an infected bull may serve healthy female animals without transmitting the disease, even when large numbers of *Brucella* organisms are present in the semen. Experiments have also been carried out in which bulls have been allowed to serve clean heifers immediately after serving infected animals with infected vaginal discharges, but in no case has the infection been passed on. It is evident that the non-pregnant womb is not a suitable habitat for the development of *Brucella abortus*. While one cannot deny that an odd case of transmission by a bull might take place, all the available evidence suggests that service by an infected bull is not an important cause of spread of the infection.

Experimentally it is fairly easy to set up infection by mouth, and the infection can also be set up very easily by placing infectious material on the eye. It is probable that infection normally spreads mainly by ingestion of contaminated food or water or by licking. M'Ewen has suggested that infection through the eye may also occur under natural conditions. The number of organisms required to infect by that route is very small, and infectious discharges can easily be flicked by the tails of cows, so that it is not unlikely that infection might sometimes spread in this way.

The most important sources of infected material are the aborted foetus and membranes and the uterine discharge in aborting cows, or in infected cows calving at full term. The greatest risk comes from the infected animal at the time of abortion or calving and for about three to four weeks afterwards (or until all discharge has

ceased), but the infection may also be passed out in the milk, urine, or faeces at any time.

Infection is most commonly introduced into a clean herd by the purchase and introduction of an infected cow. If the infected animal introduced has recently calved or aborted or is about to calve, the risk is very great indeed, but even in the case of the non-pregnant animal the risk is not absent. Although this is the common method of introduction of the disease, it is not the only one. Drops of discharge from an infected cow may contain very large numbers of the infecting germs, and infectious material might easily be carried from farm to farm by dogs, birds, rats, or other animals, or on the boots or clothing of human beings. Since the disease can be spread in this way it is not by any means an easy matter to maintain a herd free from the disease without recourse to vaccination—it requires not only elaborate precautions but a good deal of luck.

Another way in which the disease is sometimes introduced is by a cow going to a neighbour's farm for service. While there she may pick up the disease by eating contaminated foodstuff or bedding or by licking, and when later on she aborts, the bull may be wrongly blamed.

(iii) *Progress of the Disease in the Herd.*—When infection is introduced into a herd which has been clean for a considerable time the result is often disastrous. It is in such herds that the disease flares up, and an "abortion storm" is one of the most unpleasant things a farmer can experience. At first there may be only an odd abortion; the introduction of a contagious disease may not be suspected at this stage and the first two or three abortions may be attributed to accidents. After a time, however, the abortions follow one after another in rapid succession and the disease spreads very quickly through the herd. At this stage there is a great deal of infectious material about the farm and the young heifer calves pick up the infection. Picking up the disease at this time, many of the young heifers probably overcome it before they are served and they are often able to carry their calves to full term. Animals which abort usually do not do so a second time, and the disease, after flaring up and spreading through the herd, appears to die down. If the herd is self-contained the disease often seems to disappear altogether; the abortion rate drops to practically nothing and the disease may be quiescent for several years. As time goes on the amount of infection about the farm dwindles and the resistance of the animals in the herd diminishes. The infection, however, is usually still present, and sooner or later the disease becomes active again and there is another distressing crop of abortions. In a flying herd, on the other hand, the infection is often kept active for years, and many of the freshly introduced young cows and heifers abort during their first pregnancy in the herd.

(iv) *Effects of the Disease.*—The infecting germs find a suitable environment for their development in the pregnant uterus. They cause death of the tissues separating the calf from the mother, and the resultant interference with the nutrition of the calf is probably

the immediate cause of abortion. Abortion may occur at any time from the third month onwards, but the majority of abortions due to Bang's disease occur in the second half of pregnancy.

The presence of the infection in the womb renders the delicate lining liable to infection with other bacteria, and there is often a considerable amount of sterility in herds infected with contagious abortion. It should be remembered that a proportion of infected animals carry their calves to full term. These animals carry the infection but are not suspected by the owner, yet they may be a potent source of infection for other animals in the herd. When such "carrier" animals calve, the discharges may contain large numbers of *Brucella* organisms and serve to infect pastures, standings, &c., just as much as the discharges from an aborting cow. Retention of the afterbirth, inflammation of the womb, and sterility may occur in such carrier cows as well as in some cows which abort.

The actual loss of milk in a herd in which abortion is active is very serious. If the average milk yield for a normal commercial dairy cow is taken as 500 gallons, then that for a cow aborting at six months may be only about 300 gallons.

(v) *Diagnosis*.—Since probably 50 per cent of abortions in cattle are not due to *Brucella abortus* at all, it is essential before planning any long-term system of control in a herd to make certain whether *Brucella* infection is present. The safest plan in the first instance, however, is to regard all abortions as of the infectious type, and take all necessary precautions until tests have been made to confirm the presence of infection. The clinical history in the herd, the fact that there have been one or two abortions, perhaps a few cases of retained afterbirth and one or two cows returning to the bull—these features may suggest the abortion to be of the contagious type, but it is sound practice to submit material to a laboratory in order that confirmatory tests may be applied. The veterinary surgeon may submit the aborted foetus and/or its membranes for examination, or he may take blood samples from a number of the suspect cows, and these are tested in the laboratory for evidence that the cows in question have been infected with *Brucella abortus*. The blood test is a very useful method of detecting the infected cow; it is a very reliable test, though it has certain limitations. It will not, for instance, pick out as "positive" an animal which has only just become infected. Following the taking in of infection, it takes some time for the cow to give a positive reaction to the blood test, and the extent of this delay depends upon the amount of infection which was taken in—the greater the amount of infection the shorter the interval before the blood test gives a positive result. The blood test also occasionally gives misleading results in the case of heifers or cows which, although infected, do not give positive reactions to the blood test until after aborting or calving, or even for two to three weeks after that. This fact has led to some difficulty and much annoyance in some herds where eradication by blood-testing and segregation has been attempted. With all its limitations, however, if used intelligently the blood-test is a valuable aid in diagnosis and in control.

(vi) *Is there a "Cure" for Contagious Abortion?*—There is perhaps no disease which offers the quack medicine manufacturer such wonderful opportunities as contagious abortion. The disease is so widespread and so costly that it is only natural that when confronted with the mounting toll of abortions the farmer should turn to one or other of the much-advertised "cures" for abortion. It is indeed unfortunate that we have, in this country, no law prohibiting the marketing of such preparations.

The apparent success of these "cures" is due to the fact that stock-owners tend to measure the progress of the disease by the number of abortions experienced; they forget the infected cows which have not aborted—the infertility, retained cleansings, and all the rest. There are still, in some parts of the country, farmers who believe that the introduction of a billy-goat into the cow byre will prevent further trouble from abortion, and the billy-goat owes his popularity to the same factors which make it appear that a particular "cure" has been effective in reducing the abortion rate.

As already described earlier in this article, when a herd is infected with abortion for the first time the abortion rate rises gradually and then more rapidly to a peak, and then falls away to practically nothing. The disease, having flared up, dies down and remains quiescent perhaps for several years. The farmer, having had no previous experience of the condition, is at his wits' end when the herd is at the height of the "abortion storm"—he is ready to listen to anybody and try anything. It is just at this stage that he tries the latest "cure," or, it may be, installs a billy-goat. Afterwards the abortions fall off and the active disease dies down. The patent medicine (or the billy-goat) gets the credit for this merciful deliverance and gets a good advertisement at the same time, because the farmer will tell all his friends. A few years later the disease flares up again in the herd, and this time the owner is quick to remember the particular "cure" which was successful before. The only difference is that this time he uses it immediately when he gets the first one or two abortions, only to discover, however, that it makes no difference to the flare-up of abortion which follows. The remedy is then discredited and discarded.

It will be observed that these "cures" usually have a life of a few years before they are discarded, long enough at any rate for the collection of a very considerable profit by the makers. A good many have been produced during the past twenty years—is it not about time that we had some effective legislation to control the marketing of such products?

Recent discoveries in chemotherapy—in particular the discovery of the sulphonamides and of penicillin—have given rise to the hope that one day we shall have an effective cure for contagious abortion. The effectiveness of a cure will not be measured merely by a reduction in the abortion rate. A curative medicine will only be regarded as effective if it kills or enables the body to kill the actual germs of disease and allows the body to effect the necessary repair to damaged tissues. If an effective cure were available it would be possible,

presumably, to treat infected pregnant cows, halt the disease process, and kill out all the organisms so that the cow delivers a healthy calf at full term and herself remains healthy. It would be possible, presumably, to treat "carrier" cows and eliminate the disease from them—in fact, eradication of the disease would be in sight. But this "wonder drug" is a dream of the future. If such a drug is ever discovered it will require to be tested very carefully, first of all in the laboratory and then under all the manifold variations of field conditions, before it will be possible to recommend its general use. In the meantime farmers should be very wary of accepting the claims made for the various cures and remedies for contagious abortion. Advertising is a subtle and clever craft.

(vii) *Control of Bang's Disease.*—Attempts to control contagious abortion have followed two main lines—(a) control by blood-testing and elimination of reactors, and (b) control by vaccination.

(a) The first of these methods is the ideal one, since it aims at the complete eradication of the disease and the subsequent maintenance of the herd free from infection. Unfortunately this method has proved very difficult of application in this country. The disease is so widespread in the country that a farmer building up a clean herd finds it difficult to obtain suitable clean stock to replace those reactors that he has eliminated. Moreover, lack of suitable farm buildings, of facilities for proper isolation of infected animals, and shortage of pasture have proved to be serious drawbacks to the working of a scheme for eradication. These difficulties, of course, have been increased in war-time, and labour problems have further complicated the issue.

In some states in America the eradication campaign has met with considerable success, but in that country compensation is paid to owners when reactors are removed and slaughtered. Under our own conditions such a system would not be practicable at the present time.

Despite the difficulties, however, many individual herd-owners have succeeded in establishing and maintaining herds free from infection with *Brucella abortus*. The reward for all their perseverance lies in improved milk yields and in the better general health and enhanced value which their stock enjoy.

The method itself depends upon the early detection of infected animals by means of regular blood-testing and the prompt disposal of these reactors either by sale or by moving them to isolation quarters in separate buildings or to another farm. The best chance of success is offered when the reactors can be moved right off the farm, though if strict isolation is observed and suitable buildings are available the segregation method is sometimes successful. In any case it is essential to the success of the scheme that the owner or farm manager be enthusiastic and vigilant and have a good understanding of the disease and how it can be spread.

It is not proposed in this article to deal at length with all the different points which are likely to arise in connection with the application of this method. The stock-owner should be guided by his veterinary surgeon in considering the practicability of a scheme

of eradication under the conditions existing in his own particular herd.

If it is decided to attempt eradication the scheme will be planned in accordance with the particular conditions of housing, &c., available. Blood-testing in the earlier stages would be carried out monthly and every possible precaution would have to be taken to prevent the spread of infection to the non-reactors in the herd. This involves the enthusiastic co-operation of all working on the farm, and if this is not likely to be obtained, it is of little use embarking on an eradication scheme. Although eradication by blood-testing and segregation is not a method which at the present time can generally be recommended in this country, it should be the ultimate aim of every farmer to eradicate the disease from his herd. It may be that with improved labour conditions and improved farm buildings, and with a more general control of the disease effected by vaccination, it might become possible in the future to consider State-aided eradication of the disease by areas.

(b) *Control by Vaccination—the Vaccines used.*—Vaccination as a method of control has been practised for many years, in fact since Bang (1906) showed that vaccination of non-pregnant heifers with live cultures reduced the number of abortions when the animals were exposed to infection during pregnancy. The method was first developed in this country by M'Fadyean and Stockman, and live vaccines have been used on a large scale for the past thirty-five years.

Vaccines prepared from killed organisms have also been used, but it is now generally agreed that they are of little value. They have sometimes been used for the vaccination of pregnant animals in which the live vaccine cannot be used, but there is no evidence to show that they give rise to any significant immunity.

The live vaccines originally used were usually fully virulent cultures capable of producing abortion if inoculated into pregnant cows. They were inoculated into the heifers or cows at least two months before service. The animals became infected, but were able to overcome the infection to the extent that they were able to carry their calves to full term. There was thus a marked reduction in the abortion rate in the herd. It was early realised that inoculation of fully virulent live cultures led very often to infection of the udder and of the milk, and when later on it was discovered that *Brucella abortus* was closely related to *Brucella melitensis*—the cause of undulant fever in human beings—it was thought that there might be danger to public health if such virulent live vaccines were generally used. Regulations were eventually imposed which prohibited the use of live abortus vaccines in T.T. herds in this country.

These earlier vaccines were very variable in quality. Some were made from a mixture of strains, some were fully virulent, others were of very low virulence. Some vaccines issued by less reputable firms were found actually to be dead at the time of purchase, and one commercial vaccine was found to be heavily contaminated with living staphylococci.

In the absence of effective legislation controlling the manufacture and sale of biological products, it was open to anyone to produce and sell live abortus vaccines. There was no standard. The vaccine could contain any number of live organisms and they could be fully virulent. Yet the bottles of these vaccines could be sold over the counter to anyone who cared to buy them.

In these days of controls is it not high-time that we had some effective control and standardisation of biological products? Such controls would be welcomed by the more reputable firms.

The great variability of the earlier vaccines used probably accounts to a large extent for the variation in results obtained. The method was often very successful, but a good many breakdowns occurred from time to time.

As time went on, research workers both here and in America began to turn their attention to the search for a vaccine which, while producing a useful immunity in the animal, would not infect the animal and, in particular, would not infect the milk. In general, it had been shown that the more virulent the vaccine the more effective was the immunity, while strains of very low virulence produced very little resistance. What was wanted now was a strain which was not fully virulent, and was therefore safer to use, but which was still capable of stimulating a satisfactory immunity.

In this country M'Ewen produced a strain of modified virulence which subsequently was used in the production of the Ministry of Agriculture vaccine No. 2. This strain, if inoculated into pregnant heifers, would infect a proportion of them and cause abortion, but inoculated into non-pregnant heifers it did not infect them. It had, moreover, the peculiar and valuable property that when inoculated into an animal it did not cause that animal to react to the blood-test. M'Ewen's vaccine could, therefore, be used without any confusion resulting in any subsequent blood-testing; it could be used, in fact, in conjunction with a scheme of blood-testing. The test would later on pick out those animals which were already infected with the virulent field strain and would indicate any particular animals in which the vaccination had not been successful.

In the U.S.A. a strain of low virulence known as "strain 19" was produced, and has been used in that country chiefly for the vaccination of calves in conjunction with the "test and slaughter" method. In virulence this vaccine was similar to M'Ewen's, but the vaccine differed from M'Ewen's vaccine in that it would produce a positive reaction to the blood-test in animals inoculated with it. Vaccination of calves between the ages of four and eight months caused the calves to react to the blood-test, but by the time the animals matured and came to be served, the majority had thrown off the infection and were then negative to the test. In America, therefore, the method of calf-vaccination has been developed in conjunction with the method of blood-testing and slaughter of reactors. A large-scale field trial carried out by the U.S. Bureau of Animal Industry gave promising results, and while the immunity produced is not sufficient to protect the animal against later exposure to virulent strains under all conditions, calfhood vaccination with

Strain 19 does give a serviceable resistance and the method is recognised as a valuable means of control of this disease. It will be interesting to see whether the method is as successful in this country as it has been in the United States. It must be remembered that conditions in this country are somewhat different, the disease is more widespread, and it may be that under our conditions calves vaccinated with Strain 19 will be subjected in later life to a more severe test than would calves vaccinated under American conditions.

It should be clearly recognised that vaccination of calves does not give a better immunity than does the vaccination of older animals; the reverse is the case. Vaccination of calves is adopted because there is less risk of setting up permanent infection, because it is a convenient method involving no delays in service, and because it does not interfere with any blood-testing done later on.

These two vaccines, the American Strain 19 and M'Ewen's 45/20, were adopted by the Ministry of Agriculture and produced by them as vaccines 1 and 2 in conjunction with the Scheme for Control of Diseases of Dairy Cattle which came into operation in 1942. Since these vaccines did not produce infection of the udder, the regulations with regard to the use of live abortus vaccines in T.T. herds were modified. The new regulations, which came into force on 1st June 1942, provided that no animal in a T.T. herd should be vaccinated with live *Brucella abortus* except with the approval of the Minister of Agriculture and Fisheries and with a vaccine approved by him. Such approval was only given in the case of T.T. herds which were already infected with contagious abortion. Since that time experiments have shown that the No. 1 vaccine can be used with safety in a female bovine of any age, *whether or not the herd is infected with contagious abortion*.

On the other hand, further experiments with No. 2 vaccine suggested that it might undergo changes in inoculated animals which in some cases might cause them to react to the blood-test and that it was less effective than No. 1 vaccine as an immunising agent. It was also stated to possess other "serious disadvantages," though these were not specified in the official statement. As a result of these observations No. 2 vaccine was withdrawn.

M'Ewen's vaccine was the product of a great deal of very precise work which in itself has added tremendously to our knowledge of the disease, and it is distinctly unfortunate that this vaccine with its particularly valuable properties has now had to be withdrawn. It takes many years to assess, in field experiments, the results of the use of any particular abortion vaccine, and if a strain which appeared to be stable was later shown to vary in virulence or to alter after introduction into the animal body, then that strain could not be regarded as suitable for vaccination purposes.

There is no doubt that the No. 2 vaccine, which has been used on a large scale, had given very good results in the field, and it is to be hoped that further research will find a vaccine of similar properties which will prove to be quite stable, and have none of the disadvantages which have apparently developed in later batches of No. 2 vaccine.

Control by Vaccination—Some Points of Importance.—It is essential that the scheme of control for contagious abortion in a herd should be decided upon by the owner's veterinary surgeon, who should carry out any of the necessary vaccinations. One has come across many instances of farmers buying their own live vaccine and injecting it into their cattle themselves, and this practice has nothing to commend it. It should be remembered that live abortion vaccine is a product of potential danger to human beings (a case of human infection with Strain 19 has been recorded). Apart from this the vaccines produced by various firms conform to no set standard, and the farmer should be quite sure that he knows what he is injecting before he takes on the responsibility of using the vaccine himself.

The fact that vaccine is being used does not absolve the owner from exercising reasonable care in the management of his herd and in the practice of hygienic precautions. Live vaccine will give a good resistance, but it is not a complete immunity, and it can be broken down if there is enough infection about. In the vaccinated herd, therefore, certain precautions should be taken to avoid mass infection, which may break down immunity and lead to more abortions. As we have seen, the greatest amount of infection is produced at the time of abortion or calving of infected animals and for a period of three to four weeks afterwards. It is necessary, therefore, to ensure the prompt destruction (by burial in quicklime or by burning) of all aborted fetuses, together with the afterbirth. If it is possible to provide calving boxes and isolate all cows at the time of calving, so much the better; even a little done in this direction is valuable—e.g., cows recently calved might be put at the end of the byre or in such a position that no discharges coming from them could be carried down to the other animals. The precautions to be adopted depend upon many factors, and the plan of campaign should be decided upon in consultation with the veterinary practitioner. The important thing to remember is that the vaccine will give the best results if it is given a reasonable chance, and opportunities for cows to acquire massive infections are avoided.

It is not always clearly understood that vaccination of cows which are already infected is unnecessary and does no good. If a cow is infected with the virulent field strain the injection of a vaccine strain of reduced virulence will not make any difference to the course of the disease in that animal. In practice, for convenience, the whole herd is often vaccinated, but if this is done the owner should not assume that any subsequent abortion or sterility troubles are due to the vaccine. These are, in fact, more likely to be due to the infection with the virulent disease germs already present at the time of vaccination.

Calfhood Vaccination in Clean Herds.—Herds which are entirely clean and free from infection are exposed nowadays to a very considerable risk. It only requires the introduction of infection (either by purchase of infected animals or by accidental passage of infection from a neighbour's farm) for a very serious outbreak of abortion to follow. Certain precautions can be taken in regard to newly

introduced animals. These should be purchased only subject to passing the blood-test and should be isolated after arrival for a month, after which time they may enter the herd subject to their passing a further blood-test. In addition to these precautions, it is well worth considering the vaccination of calves with live vaccine. This is a perfectly safe procedure if No. 1 vaccine is used and reasonable precautions taken at the time of vaccination. The calves are vaccinated between the ages of four and eight months. Heifer calves only are vaccinated; bull calves must *not* be vaccinated. As time goes on the herd built up will be not only clean and free from the disease but it will possess a reasonable degree of immunity. If infection is introduced at any time in the future it may be resisted altogether, or at least the worst effects of the infection will be avoided.

(viii) *Future Research*.—Future research must be directed towards finding even better vaccines; Strain 19 vaccine cannot be regarded as the “last word.” Better means of control must be found too, and the extraordinary advances in chemotherapy made within recent years lead to the hope that one day there will be discovered some drug which can be successfully used as a curative agent. When that happens eradication will be the watchword; with our present methods we must make do with “control.”

2. *Bovine Trichomoniasis*.

Within recent years attention has been drawn to a troublesome venereal disease of cattle which is characterised by sterility troubles and, in many outbreaks, by early abortions; its name is *Trichomoniasis*—a name derived from the cause of the disease, which is a small protozoan named “*Trichomonas fetus*.”

In a statement issued in 1942, the Ministry of Agriculture reported that the disease had been definitely diagnosed in twenty-one English counties and suspected in eleven more. In Scotland one outbreak only had been confirmed by a laboratory—this was in Ayrshire—while positive diagnosis in the field had been recorded in Argyll and in Berwickshire. Suspected outbreaks, not definitely diagnosed, had occurred in six other Scottish counties. Since that time an outbreak involving five small herds in Berwickshire has been observed and the diagnosis confirmed in the laboratory.

It seems probable that, up to the present time, the disease has not caused serious losses to Scottish farmers. Since, however, the disease is widespread in the south, and since it is capable of causing devastating losses in infected herds, it is advisable for all farmers to be on their guard against its introduction to their herds. The disease is particularly troublesome in areas where the communal bull system is used. Cows sent to an infected bull come back infected and return to service later. The owner then very often sends them to another bull in the neighbourhood and this bull becomes infected in turn. In one series of outbreaks over 100 herds became infected in this way before the disease was diagnosed.

Diagnosis and Symptoms.—The disease itself may take on various forms, and diagnosis is often difficult even for the expert. His diagnosis is based on the breeding history of the herd and on his clinical examination of the animals, but can only be confirmed by the microscopical examination of the discharges and the detection of the parasite which causes the disease. This is by no means an easy matter in some cases. It is often necessary for the microscopical examination to be made of fresh material examined on the spot, as the parasites may quickly die out in material transported to the laboratory. It is a true venereal disease. The bull becomes infected by serving an infected cow, and he then spreads the disease when serving other cows. The parasite which is passed on by the bull sets up an inflammation in the genital tract of the female, but nothing may be noticed until the cow or heifer returns to service after two to four months. The animals may have aborted, but the aborted fetus is often so small that it may not be noticed—especially if the abortion occurred at pasture. At this stage there is often a discharge present, but this may clear up and the animal is served again, only to break service after a further period of two to four months. This may happen repeatedly in some cows, others may carry their calves to full term but remain infected, while a few may appear to carry their calves, and when the time to calve arrives they discharge several gallons of pus. Other cows may throw off the infection altogether.

Very often the bull is suspected and a new bull is bought. He becomes infected in turn and himself passes on the infection to further cows. In its mildest form the disease causes disturbing losses; in its most severe form the results are catastrophic, and it is a disease even more to be feared than contagious abortion.

Any farmer who has reason to suspect the disease should stop all breeding at once and obtain veterinary advice. This should be done *before* trying another bull. Any of the following happenings should give rise to a suspicion that the disease may be present:—

- (i) Several cows or heifers repeatedly returning to service.
- (ii) Abortions occurring early in pregnancy.
- (iii) Unusual discharges occurring several weeks, or months, after service.

A discharge appearing at the time a calf should have been due.

Control.—When this disease has been definitely diagnosed the control measures which are instituted aim first of all at prevention of infection of any cows or heifers which are known to be clean. A fresh clean bull is used to serve these. Infected cows can be treated, and in most cases treatment is successful. A separate clean bull may be used on the cows successfully treated or the veterinary surgeon may prefer to inseminate these artificially, using semen from the clean bull used in the other section of the herd.

Treatment of the bull is unsatisfactory and is, at present, rarely attempted.

Precautions.—There is no reason why the disease should become a major problem in Scotland if farmers take adequate precautions. There is, as yet, no reliable test which can pick out the infected animal with certainty, but the fact that the disease is a venereal disease, transmitted only by the bull, means that we can take effective precautions against its introduction.

In the first place, accurate breeding records should be kept and the bull should not be allowed to serve a neighbour's cow if there is any suspicion attached to her breeding history. Similarly a cow should not be sent to a neighbour's bull for service if there is any breeding trouble in his herd. Due care must be observed when purchasing new animals. Cows with discharges should be avoided, and if an aged bull is purchased it is advisable to make certain that he comes from a clean herd. It is a useful plan, if practicable, to keep a clean bull for the service of heifers only.

Finally, if cows or heifers are returning to the bull, it is advisable to try to find out the cause before trying another bull.

3. *Abortion due to Bacteria other than Brucella Abortus.*

(a) *Tuberculosis.*—Infection of the womb with the tubercle bacillus occasionally occurs and abortion may result; there is often a discharge afterwards, and the animal may become completely sterile. There may be no other obvious sign of tuberculosis and the animal may be in good condition.

It is possible that many cases of this kind go undiagnosed, as it is impossible to determine the infection with any certainty without the aid of a microscopic examination. Stock-owners who have cases of abortion in which there is some obvious abnormal colour or purulent condition of the afterbirth would do well to seek veterinary advice. In cases of abortion which occur in vaccinated animals in herds infected with *Brucella abortus*, it is advisable not to jump to the conclusion that the abortion is due to *Brucella*; it may be due to some other cause such as tuberculosis, and examination by a veterinary surgeon, backed up if necessary by laboratory examination of the afterbirth and/or foetus, should decide the point.

An exact knowledge of the incidence of tuberculous abortion in this country is not available, but the condition is not uncommon. It will easily be appreciated that a cow, spreading large numbers of tubercle bacilli in afterbirth and discharges, will be a menace to the health of the rest of the herd and a danger to human health as well.

(b) *Vibrio fetus.*—Infection with *Vibrio fetus* in cattle is rare compared with that due to *Brucella abortus*. The majority of cases of vibronic abortion are sporadic cases, though there have been a few reports in other countries where more serious epizootics have occurred. It seems that under exceptional circumstances abortion due to *V. fetus* may be of considerable importance in a particular herd, but in this country abortion due to this cause is comparatively rare and of little general importance.

(c) *Corynebacterium pyogenes*.—This is an organism which has become more and more prominent in veterinary literature during the past few years. It is associated with a variety of troublesome conditions in cattle and sheep, and it is mentioned here because in some herds it has been found connected with outbreaks of sterility and is occasionally associated with early abortions.

This is the germ which infects the udder in cases of summer mastitis or "udder clap," and it is also found in pneumonia in calves and in various suppurative conditions in cattle, pigs, sheep, and goats.

Abortion associated with *C. pyogenes* infection is rather rare, and the evidence that this germ is the primary cause of abortion in these cases is not very clear. If abortion occurs it is usually between the 12th and 24th weeks, but the calf may be carried to full term. After calving or abortion there is often a persistent dirty white vaginal discharge (the "whites") and the cow becomes sterile.

Stock-owners observing such discharges in their cows should seek veterinary aid at once, as these infections are often troublesome and may spread through the herd.

(d) *Other bacteria* may occasionally be associated with abortion in cattle, but these are, for the most part, academic curiosities and need not be considered here.

Conclusion.—When a farmer is confronted with cases of abortion in his herd he should take early steps to ascertain whether the abortions are contagious in type so that suitable measures can be instituted to effect control. Contagious abortion due to *Brucella abortus* is by far the commonest type, but one or other of the other bacterial types, though of comparatively little general importance, may be of particular significance to individual farmers. Trichomoniasis is a disease of great importance which may be on the increase, and the precautions to be adopted against its entry to a herd have been outlined.

For the rest, sporadic cases of abortion may be due to one of the variety of other causes which have been discussed, but these non-specific types of abortion form a surprisingly high proportion of the total abortions in herds throughout the country, and more research is needed to determine their exact causes and the methods to be adopted for preventing them.

ABORTION IN SHEEP.

The research worker investigating abortion in sheep is brought face to face with a difficulty which is not met with by his colleague working on abortion in cattle. Apart from the Dorset Horn breed, in which two matings a year are possible, the great majority of sheep breed once a year only, and in any district the lambing season extends over the short period of about six weeks. Material for the investigation of the causes of sheep abortion is, therefore, only available during a period of about six weeks in the year. If

attempts are then to be made to transmit the disease to other sheep, it is necessary to establish flocks of late-lambing ewes so that the experimental inoculations can be carried out early in pregnancy. As it is extremely difficult to get the ewe to take the tup after the end of February, it actually becomes impossible to carry the infective agent on in sheep between one lambing season and the next tupping season. The time during which investigations may be carried out is thus limited to a comparatively short period in the year, and unless means can be devised to maintain the suspected infective agent alive and virulent in the laboratory between one breeding season and the next, there can be no link between the work of each successive year.

Abortion in sheep may be of the infectious bacterial type, in which there is a high incidence for a single season, after which the flock is usually clear of the disease, or it may occur in enzootic form, in which the incidence is lower, but the disease persists in the flock for a long period of years. Outbreaks of abortion are also found in association with tick-infestation in unacclimatised sheep. Various accidents and errors of management have from time to time been blamed for outbreaks of sheep abortion.

1. *Infectious Abortion.*

The majority of outbreaks of infectious abortion in sheep in this country are associated with infection with one or other of two different organisms—*Vibrio fetus* and *Salmonella abortus-ovis*.

The Departmental Committee appointed by the Board of Agriculture carried out extensive investigations into sheep abortion, and their report, published in 1913, makes interesting reading. These investigators showed that many of the outbreaks of abortion were due to infection with *Vibrio fetus*. Their material came from outbreaks in counties in Eastern and Southern England only, but answers to a questionnaire showed that flocks in which more than 10 per cent of abortions had occurred were located in thirty-four counties, including six Scottish counties. It is a remarkable fact that up to the present time there is no record of this type of infection having been confirmed in Scotland. A good many bacteriological examinations have been made, but in no case has this organism been demonstrated. In England, on the other hand, the disease is not uncommon—in 1944 it was reported to be particularly prevalent.

The other organism which commonly causes infectious abortion in sheep, *S. abortus-ovis*, was described by later investigators. This type of abortion is chiefly found in the eastern counties of England and has not yet been recorded in Scotland. Abortion losses from either of these causes usually range from 10 to 40 per cent, but occasionally may be much higher. The infections probably gain entrance by the eating of food, pasture, &c., contaminated by infected sheep. There is evidence that these infections may be picked up from contaminated pasture, but it is not known how long

a pasture may remain contaminated, and it is thought that most outbreaks in hitherto clean flocks are caused by the introduction of an animal carrying the disease in latent form.

Before the abortion occurs there is usually a blood-stained mucoid discharge which can be seen one or two days beforehand. In the case of vibriotic abortion the abortions may occur quite early in pregnancy and continue up to shortly before lambing, but *Salmonella* abortions are usually limited to a period of about four to six weeks before lambing. With both types of infection it is unusual to find the trouble extending over more than one season, though fresh cases may occur if clean ewes are introduced. It might be possible to produce vaccines to prevent these infections, but as the disease is a one-season disease the difficulties of assessing the value of the vaccines would be enormous, while it is unlikely that such vaccines would be extensively used even if they were produced.

2. *Abortion associated with Tick Infestation.*

When a susceptible flock of pregnant ewes is moved on to land which is infested with the tick a considerable abortion rate is usually observed. It is probable that this abortion is associated with infection with tick-borne fever. In this disease the temperature rises sharply a few days after the sheep has been bitten by a tick, and a high fever persists for a period of seven to ten days or even longer. Where this disease occurs the majority of ticks are infected, and even low-grade tick infestations might produce the disease. This is a point of some significance, since, while heavy tick infestations are quite obvious the lighter infestations might easily be missed, yet they may well be the means of causing heavy loss in a susceptible flock.

In an outbreak which came to the notice of the writer during the season 1943-44, a farmer moved a flock of half-bred ewes from his farm in Midlothian on to a farm in Selkirkshire. It was known that the hill grazings of this farm were heavily infested with tick, but the inbye land was reputed to be free. The ewes had already been tupped when moved in November. A few abortions occurred in December and many more occurred later on in the season, over 30 per cent of the ewes aborting. Many of the aborted lambs were rotten, and it is probable that the death of the fœtuses occurred much earlier, the lambs not being discharged until later. Investigations carried out by Mr J. A. Campbell, B.A., M.R.C.V.S. (University Department of Advisory Entomology, Edinburgh), showed that ticks were present in small numbers on nearly all the *pastures* on the lower ground on this farm. These observations have been confirmed this year, tick having been found persisting in small numbers on the young grass field which was last year's turnip field, on which the sheep were folded.

In another instance, in 1943, half-bred ewes from a tick-free farm were sent on to a turnip field on a nearby farm. The sheep were moved on 10th February and were taken over a tick-infested

hill as a short-cut to their destination. Within fourteen days six had aborted, and although the sheep were then brought home abortions continued. The total abortion rate was about 16 per cent.

Sheep which have been infected with tick-borne fever and repeatedly exposed to further infection develop a considerable degree of tolerance, and they do not show the intense febrile reaction when exposed later on to fresh infections by further ticks attaching themselves. This is probably the reason why flocks of sheep grazing permanently on tick-infested land do not show any appreciable abortion rate—they are acclimatised. In the case of the Midlothian flock of Half-Breds mentioned, the lambing this season has been most successful, the survivors of the original flock having presumably become acclimatised. In areas where the tick is spreading it is possible that some farms, as yet lightly infested, will experience a relatively high abortion rate. After a time this may be limited to any newly introduced ewes and to the gimmers. If the ewe-hoggs are wintered away they may not come back on to the infested land until after tick activity has subsided, and some may not contact the infection; these may first meet with the infection in the following spring as pregnant gimmers, and abortion may result.

In view of the dangers of tick infestation to unacclimatised sheep, farmers who contemplate a move into or near a tick area would do well to seek expert advice before moving their flocks.

3. *Enzootic Abortion.*

This type of abortion was described by Dr J. Russell Greig in the 1943 volume of the 'Transactions,' to which reference should be made.

"Enzootic abortion" has occurred in certain areas and on certain farms for many years. The incidence of abortion is variable, but in the majority of cases it ranges from about 5 to 10 per cent. It is difficult to get exact figures, as many shepherds distinguish the "kebs" or "rotten lambs" from the "abortions," which they note in each "smote" about a fortnight or so before lambing. If the number of yeld sheep is noted this includes a proportion of "tup-yeld" and does not take into account those ewes which have aborted later in the lambing and for which lambs have been found. It is quite evident, however, that the losses from this condition have been very serious. A questionnaire sent to farmers in one district in Berwickshire showed that the condition existed on nineteen farms out of ninety-five, and that on these nineteen farms an average of nearly 400 ewes aborted annually.

In many cases the disease had a high incidence in the first or second year in which it was noted on a farm, but has shown a gradually decreasing incidence in the following years; in some instances it has apparently died away altogether, but the disease crops up on fresh farms every year.

Cause.—The cause of enzootic abortion is unknown, and there may well be more than one cause operating in some outbreaks.

Evidence from the field is, in fact, so conflicting that it is unlikely that there is just one type of abortion and one cause.

There are certain features which suggest that an infective agent may be operating in some outbreaks. In the first place, the incidence of the disease on some farms, rising to a peak and then gradually dwindling, could be explained on the theory that the disease was gradually being spread through the flock, and with the development of a flock immunity the effects of the disease—*i.e.*, abortion—are reduced to negligible proportions. We see the same thing happening in herds of cattle infected with *Brucella abortus*. In the second place, the appearance of the foetal membranes in many cases suggests that an infectious process is at work. In no case, however, has any *visible* micro-organism been detected which could conceivably have been the cause of abortions.

Thirdly, the sudden appearance of the disease on new farms, and in some cases its apparent spread to adjoining farms, suggests that the condition may be caused by an infective agent.

The fact that draft ewes, when they leave the flock and go on to other farms, do not abort does not conflict with the theory of an infectious agent as the cause. If infection is at work it is more than likely that a sheep will have met with it during its stay in the flock, and it is quite possible that the majority of draft ewes might have passed through the disease and become immune. In affected flocks where aborting ewes are kept on the farm it is rare to find them aborting a second time.

If the disease is an infectious one it may be possible to transmit it experimentally, and trials are at present being carried out to determine whether this can be done.

Dietetic Factors.—If the cause is not an infective agent then it is presumed that some environmental factor such as a dietary deficiency might operate. Working on this theory, Greig and Dryerre tested the effect of administration of various minerals, of vitamins A, D and E, and of proteins, but no significant reduction in the abortion rate was achieved. More recently samples of soil and pasture have been collected on twelve farms on which abortion regularly occurred and on fourteen farms which were free from the trouble. These samples have been chemically and spectrographically analysed, but no significant difference could be detected between "abortion" and "abortion-free" farms. Evidence from the field is very conflicting. In a few instances farmers claim to have eliminated the disease by using cobalt licks, but on many other farms the disease persists in spite of the use of cobalt. On some farms the introduction of concentrate feeding early in the year has apparently led to a reduction in the incidence of abortion, though there are many flocks where supplementary feeding is started early and where abortion has continued at the same rate.

Whether or not the feeding of concentrates reduces the abortion rate, it is a practice which has much to commend it. Hammond has shown that the size and strength of the lamb at birth can be considerably affected by the state of nutrition of the ewe during the second half of pregnancy. The weight of single lambs is not

much affected as the mother can easily supply the necessary nourishment from her own body, but where twins are carried nutrition during the second half of pregnancy is of great importance. In many cases flocks of half-bred ewes are brought through to lambing on turnips and a little hay, together with what they can get off the pastures during the winter months, and they are not given any extra feeding until they come into the lambing field. If some concentrates can be spared it is a better plan to start box-feeding much earlier in the year so that the developing lambs get proper nourishment during the second half of pregnancy.

Turnips have often been blamed for causing abortion in sheep, but there is little real evidence that they do have any such effect, even when fed in excessive amounts. Many farmers, confronted with a high abortion rate, have sought to reduce it by cutting down the amounts of turnips fed or by having turnips laid down instead of allowing the sheep to eat them on the breaks, but in most cases these variations have made no difference. On one farm known to the writer the experiment was tried of keeping one-third of the flock folded on turnips, one-third had turnips laid down, and one-third had no turnips at all. In other respects their treatment was similar—each group got some hay and supplementary feeding. In this flock the abortion rate in previous years had been about 10 per cent. It continued at the same level and there was no apparent difference between the three groups. This was a very useful experiment carried out by the farmer himself, and, as far as that particular farm was concerned, it was evident that the eating of turnips had nothing to do with the abortions.

The use of mineral licks and mixtures is recommended by some and condemned by others. Frazer, in his book 'Sheep Farming,' condemns the use of mineralised salt licks, pointing out that sheep with a craving for salt may quite well take in too much of the mineral. This seems a sound argument, particularly with regard to iodine, which may be beneficial in small amounts in some areas, but if taken in too large amounts will itself eventually give rise to abortion and sterility.

The writer has paid particular attention to the use of mineral mixtures in investigating outbreaks of sheep abortion. In some flocks two or three different types of mineralised lick are used—in others none at all; in fact in most cases the incidence of abortion seems to bear no relationship whatever to the use of these products. The analysis of pasture grasses and soils, already referred to, did not reveal any noticeable mineral deficiency, nor was there any difference between abortion and abortion-free farms in this respect.

Conclusion.—It will be seen from the foregoing discussion that the problem is a complicated one. Much work has been done, but no one factor has been incriminated as the cause for this type of abortion in sheep. It is likely that it will eventually be found that several causes may operate. Without a definite knowledge of the cause it is not possible at present to make any general recommendation regarding prevention.

THE WORK OF THE NATIONAL INSTITUTE OF AGRICULTURAL ENGINEERING.

By S. J. WRIGHT, M.A.

THE National Institute of Agricultural Engineering has been in existence in its present form for nearly three years. For much of that time day-to-day war-time requirements, such as testing carried out solely in connection with the control of materials and manufacture, have tended to obscure longer-term activities. But the idea behind its work is much older. The Oxford Institute on which it was based was founded in 1924, and, in spite of many handicaps, had laid a good foundation for much of what is being done now. In the circumstances, it seems desirable to describe the work of the new Institute on a rather broader basis than that of what has been actually started and finished during its infancy. Following a brief description of the general aims of the Institute's work, therefore, there is given a general review of some of the main subjects in its programme. This covers not only the work in progress or accomplished over the last year or two, but refers also to some of the foundation work done at Oxford and elsewhere and to the directions in which it seems likely that progress will be made in the future. The review does not cover all that is going on—there is, for example, no mention of the potato crop, nor of hay or silage, although active work on all three is in progress. The items chosen do, however, illustrate the kind of problems that are being studied and the nature of the work which they involve.

The main purpose of the N.I.A.E. is to assist agricultural mechanisation by the development of new or improved machines and the study of the technique of using them. Progress in mechanisation involves three stages: finding out what machines or improvements are needed; carrying out the experimental testing and design work necessary to produce them; and, by practical trials and demonstrations, fitting the result into everyday farming. The work described in this note is mainly concerned with the last two of these aspects. It is, however, worth emphasising that the first is equally important and that the Institute devotes a good deal of attention to it. For it is not sufficient that a new machine should be capable of doing the straightforward job required of it. Before farmers can benefit from it, it must be a commercial proposition from the manufacturers' standpoint; and this means that it must appeal to a wide enough circle of customers to be made cheaply. It must be adaptable to a wide range of farming conditions and, particularly where small farms are concerned, must fit in with the equipment used for other crops or purposes. In order to assist manufacturers with this, the Institute aims at providing a clearing-house for information of all kinds relating to agricultural machinery

and its use. In particular, through its Farm Mechanisation Enquiry, it maintains contact with representative groups of ordinary farms all over the country and records in detail the use which they make of their equipment. The Enquiry at present covers seven centres: five in England, one in Scotland, and one on the Welsh border. The number will shortly be increased to twelve.

The technical work of the Institute consists mainly of testing and experimental research. Some testing is done simply to provide manufacturers with an impartial and accurate report on the performance of their machines. A great deal more testing, however, is carried out to provide information needed in the Institute's own work. Whatever the question at issue, the logical starting-point is to test and weigh-up the equipment already available, including wherever possible the most up-to-date examples from overseas. The next stage is to carry out more critical tests of the components which need improvement, and by research and experiment to arrive at mechanisms which will accomplish what is required. Finally, the results are embodied in an experimental prototype for practical trial in the field.

TRACTORS.

In 1930 the Royal Agricultural Society organised, and the Oxford Institute carried out, the World Tractor Trials. These, it may be remembered, attracted thirty-five entries from home manufacturers, the U.S.A., and four European countries. Each machine was put through a comprehensive programme of preliminary tests, and there was afterwards a Public Demonstration of the whole entry at which the full report of the technical tests was available. These trials marked a new epoch in two distinct ways. First, there had been no public trials for ten years, and in the meantime tractors had changed out of all recognition. Up to then, the word "tractor" had conjured up a mental image of the clumsy unreliable contraption which figured in the Food Production Campaign of the last war. At this demonstration, farmers saw a wide range of really practical machines in operation, including the original Farmall—the first rowcrop tractor of all time. Secondly, the need for working out, and learning to use, dynamometers and other equipment in connection with the trials put formal performance testing on a sound footing. Seven years later the Oxford Institute, again in co-operation with the R.A.S.E., set up a permanent scheme for testing tractors on still more practical lines. The scheme itself is now at an end, but the N.I.A.E. still carries out tests of new models on precisely the same lines.

The 1930 trials also focussed attention on the need for research on tractor wheels, and a start was made on this problem shortly afterwards. This work culminated in a very comprehensive series of research tests carried out for the British Rubber Producers' Research Association on the pneumatic tractor tyres which had come into use. Most of the field-work involved in these tests was carried out just before the present war, although the final analysis

of results and publication of the Report has only just been completed. These tests showed that overall diameter and ratio of axle weight to drawbar pull were the factors which had most influence on pneumatic tyre performance. If these factors were adequately adjusted to the power required, such other factors as tyre pressure, cross-section, or tread pattern were relatively unimportant. Just recently, a very interesting application of these results has been made. Everyone knows the magnificent practical performance which ordinary Fordsons have achieved during the war. On the other hand, many farmers have also realised their limitations—in particular, how the drawbar pull which they will exert in practical work varies with soil and contour. On heavy land in firm condition the tractor may give a pull of 3000 lb. : on the same land in wet conditions or on a loose soil, even if it is dry, the same tractor can hardly pull half as much. In the view of the N.I.A.E., such wide variations in performance were mainly due to the wheels being too small and the rear axle weight too low. We therefore took an ordinary Fordson, and for demonstration purposes modified it by fitting larger diameter tyres and providing additional weight. The tyres were of the same section as before ; but their new diameter, the amount of added weight, and the way in which it was added, were worked out on the basis of the research results already mentioned. Practical tests of the resulting tractor have shown that it can be relied on to give a drawbar pull of over 3000 lb. under practically all ordinary farming conditions. Another tractor development into which much testing effort has been put is the so-called half-track conversion. Originally this was regarded only as a means of providing a reasonably efficient substitute for tracklaying tractors while these were in short supply ; but now the development seems likely to go further. So far as adhesion is concerned, the performance of almost any form of track—half or complete—is markedly superior to that of any wheel of ordinary size. From this point of view a Fordson fitted with any one of the various conversion sets that are in experimental production is just about as efficient as a full tracklayer with an engine of corresponding size. The conversion outfit, on the other hand, is less handy : it requires a larger turning-circle, while with present designs close coupling of implements is impossible. Moreover, it is not yet certain how the new tracks will wear in practice. But the latter point can presumably be taken care of when first-class materials are once more available ; while tidier design can certainly go a long way to obviating the other defects mentioned. In the long-run, the advantage of having—at an inclusive cost of, say, something less than £400—a tractor which as the result of a half-hour change-over can be either the equivalent of a medium-powered tracklayer or a wheeled tractor is likely to offset any petty inconveniences that remain.

To one tractor problem there is still no solution : that of providing the “ missing link ” which will enable horses to be dispensed with altogether—more especially on the small mixed farm. As the results of the Institute’s Farm Mechanisation Enquiry show, there

are still plenty of jobs on any farm which horses can do at least as economically as tractors. The difficulty which many farmers are up against, however, is that horses need care and attention on holidays and at the beginning and end of the day. The story of the American farm-worker who welcomed tractors because he "was tired of being chamber-maid to a pair of mules" is no longer just a story. Some of the light tractors with complete sets of directly-attached implements have done remarkable work in the direction of the "missing link"; and yet on the really small farm they only accentuate the final difficulty which arises from having all the power in one unit. Another development which may contribute to the solution is the new type of motor cultivator of which there are two examples in limited production. These have a low-powered engine fitted right over the drive wheel or wheels at the rear of the outfit where the operator also sits. All the forward part is simply a chassis on which a variety of tools, drills, distributors, hoes, or even a box body for light farm transport, can be fitted. There are caster-type wheels at the front with tiller steering so that the whole thing can turn in its own length. This is a horticultural development at the moment; but something on the same lines may easily have wider, and even far-reaching, applications one day.

SUGAR-BEET HARVESTING.

This is only one aspect of the more general subject of root harvesting, but it is the one on which the attention of development workers has been mainly focussed up to now. One reason is that there have been specific research funds available from the Sugar-Beet Research and Education Committee. Another is that the crop has been more generally remunerative than other farm root crops and therefore more likely to provide the machinery manufacturer with an economic market. But the sugar-beet grows more firmly in the soil than other roots, and needs to be topped more accurately, so that it offers relatively difficult problems to the engineer. When these have been solved and beet harvesters begin to come into general use, it is likely that adaptations suitable for mangolds and turnips will follow fairly rapidly.

During the early 1930's quite a number of beet harvesting machines were imported from the Continent and tried out generally by the Oxford Institute and the Norfolk Agricultural Station in co-operation. There were the Siedersleben topping and lifting machines from Germany, the Salleng lifter-loader from Denmark, the Marlière and Dubonnet complete harvesters from France, as well as a Belgian machine whose name cannot now be recalled. These machines were not very different in their way from the British-made Catchpole which came much later and is now in limited commercial production. Nor, so far as one can recall, was their general performance markedly inferior to that of more recent machines. Indeed, the main reason why no one of them reached real commercial production was that, particularly in their countries

of origin, neither cost nor scarcity of labour was serious enough to create a market for them. In view of what follows, the most important point to note about them is that they all incorporated cleaning mechanisms to remove and separate soil from the beets.

In those early days the performance of beet harvesters was looked at with finicky eyes, and inaccuracy of topping compared with hand-work was the point most readily criticised by farmers. More accurate topping was the main feature claimed for the Catch-pole harvester when it began to appear publicly in 1938. The height of cut of its twin topping discs is regulated by a track-laying device which is positively driven so as also to offer support to the beet during the topping operation. In careful tests carried out by the Oxford Institute for the Royal Agricultural Society (who subsequently awarded the machine a Silver Medal at the Centenary Show) the topping of the machine was fully up to the standard set by the experienced hand labour then available. Subsequent tests showed that the topping mechanism was liable to frequent stoppages on stony land, and one of the first direct contributions of the N.I.A.E. to beet harvesting was the evolution of a less vulnerable topper with discs both power driven and free to spring apart when stones jammed between them. This modification was soon followed by a similar spring-disc arrangement by the original inventor which proved hardly less effective in overcoming stoppages through stones. The power-driven discs of the Institute version, however, seem to have their advantages on heavy land. Broadly speaking, the aim with this particular machine—the only harvester in active development in this country at present—has been to eliminate teething troubles and, without changing its general principle, to make it applicable to a wider range of land than the very light stone-free land for which it was originally designed. On suitable land—and in the absence of teething troubles—the machine with one operator and a tractor driver will lift $2\frac{1}{2}$ acres per day, spreading the tops at random over the land already lifted and dumping the beets at intervals so as to form rather irregular rows roughly at right angles to the beet as they grow. Assuming this to have been accomplished, the main snags are that the tops are left in such a condition that they are suitable only for ploughing-in, while the beets are put on top-strewn land, so that they cannot be loaded with forks. The last-mentioned defect can be remedied by a rake attachment fitted to a number of these machines by a Shropshire agent, which is used to clear a patch of ground immediately before each load is dumped. Even then, however, loading and carting-off involves a lot of labour. Another adverse criticism applies equally to any machine which discharges roots or tops on one side only: it must be worked in lands so that there is a good deal of hand-work to be done in opening-up the field.

In the meantime, new principles came forward for examination in two experimental machines imported from America for trial. First there was the Scott-Viner (later to be called the Scott-Urschel) harvester, which lifted the beets by their tops with an arrangement of rubber-faced belts, and topped them by means of a pair of dished

discs after they had been lifted from the ground. It may be of interest to mention that this machine was designed originally for lifting red (garden) beet and that its development was sponsored by a large canning concern so that it could be hired out to growers. This machine did not seem to be very well adapted to our conditions, but the model so far tested was a rather early one and the newer version which is available for trial this year may give a better impression. The other American harvester, made by John Deere Ltd., had advantages which have changed our ideas quite considerably. Since the detailed mechanism of this machine—although not really complicated—is almost impossible to describe briefly,



Fig 1 —Rear view of John Deere Sugar-Beet Harvester at work

only its general arrangement and method of working will be discussed here. The outfit consists of topper, top elevator and discharge conveyor, lifting shares, root conveyor and windrower, all mounted on a three-wheeled tractor so as to form a one-man outfit. The top conveyor is capable of being extended to cover the width of four rows on either side of the machine, while the swinging root windrower can be extended over four rows, again on either side. The machine can therefore work straight across the field—with no preliminary opening-up—and leaves a perfectly orderly arrangement of windrows each containing the produce of eight rows of beet, separated by dual windrows each containing four rows of tops. To see this orderly arrangement accomplished by one man alone (at the rate of $2\frac{1}{2}$ acres per day in suitable conditions) is very

impressive. The machine is used in conjunction with a loader—not unlike an elevator potato digger with a kind of pick-up attachment—with which one man can load the beet (into a lorry or trailer drawn alongside) at a rate of up to 4 acres per hour in a 15-ton crop. This type of machine is so outstandingly convenient from the farm organisation point of view that it may make all others obsolete in their present form. It is not the fact that it needs only one man that is important, but that it does all the job with the same size of labour force. Any of the other machines needs additional hand labour for opening-up and for loading and tidying-up afterwards. To find casual labour at a reasonable price for these odd jobs which the ordinary machine leaves undone is almost more difficult than to find it for the whole job. Moreover, the John Deere scheme leaves a tidy result at any stage of the job. Loading and carting off of either beet or tops (with the latter in good condition) can go on at any time regardless of whether the main lifting has been completed or not.

This machine embodies one principle which is likely to become general in all American root harvesting developments: that it is better not to try to make the harvester put the roots straight into a vehicle. The roots should be put in a neat windrow for subsequent mechanical loading. One reason is that the bulk to be handled is so great that with direct loading an expensive harvester is constantly being held up for lack of transport or to allow vehicles to manoeuvre. Another is that mechanical loading as a separate operation tends to reduce dirt tare.

On the other hand, the machine—like all others of American origin so far observed—falls short of our mental standards of performance in two respects: the topping is not efficient enough, and there is no cleaning mechanism on the machine itself. These shortcomings limit the application of the harvester at both ends of the soil range. On very light soils the simple stationary topping knife tends to push the beet over and, instead of topping them properly, to break them off diagonally. Again, on soils which are heavy or wet, the whole mechanism is liable to get choked with soil and debris.

Following overall tests of all these machines, and a general weighing-up of their shortcomings, the Institute has been carrying out research tests of some of the essential components. In these, it has concentrated on four main problems: topping, top removal, cleaning, and final disposal of the crop. In each case the aim has been to provide the research data necessary for the design of a more efficient or cheaper mechanism for the purpose in question. This work is highly technical and in its present stage rather far removed from practical farming. One example of the work on cleaning mechanisms may, however, be of interest. The first step was to carry out lifting tests with the various machines, separating out and weighing all the material that came from them. Ground conditions were wet, but not unduly so for the latter part of the harvest season. It was found that there was very little difference between the quantities of dirt put into the windrow respectively

by a machine with a conventional knocker type of cleaning mechanism and an American machine with no specific cleaning mechanism at all. In both cases the weight of dirt delivered considerably exceeded the weight of beet lifted. Another of the machines tested—an obsolete Danish model—had a rotary cleaning device which, in comparison with the others, was remarkably effective under the prevailing conditions. In further experiments the beets were collected as they came from the lifting shares and the quantity of soil adhering to them weighed. It was found that there were marked differences between the performances of different types of share and that, in particular, the shares of the American machine mentioned lifted less soil than any of the others. Work of this kind has been carried out on each essential component in turn. Sometimes the result has been to show clearly that one of the types tested is better than all the others; sometimes none has been good enough, but the results have suggested a further design for trial. From the selected components a composite prototype will be built up for trial next year.

REDUCTION OF SPRING LABOUR WITH ROOT CROPS.

This is an example of a development in mechanisation which depends more on change of method than on machinery. It originated from the U.S.A. and is concerned at present with sugar-beet. The sugar-beet "seed" in its commercial form is actually a cluster of seeds from which several plants are liable to grow. The same is true of garden beet and mangolds. With all these crops final singling is an intricate process, because it is a matter of selecting and leaving one plant out of several which are virtually joined together below ground. The new method depends on a preliminary process called "segmenting," which consists simply of cracking-up the commercial seed into fragments. After grading, it is found that somewhere about 80 per cent of the larger fragments contain only one seed; and these, amounting to about one-third by weight of the original sample, are sown instead of the original seed.

The use of segmented seed at a rate of 7 or 8 lb. per acre simplifies singling and may save as much as half the labour ordinarily required. A much more spectacular saving has, however, been accomplished by combining segmented seed with drastic cross-hoeing. Cross-hoeing, with an interval of 3 or 4 inches between the hoes, has been fairly widely practised in the South over the last few years as a means of gapping the plant before singling. The latest idea is to get a thin but regular plant with segmented seed and then to single mechanically by cross-hoeing with the hoes set only an inch or two apart. With beet grown on ridges, much the same kind of thing can be accomplished by making drastic use of a root gapper used along the rows. The result very often looks appalling: there are some doubles and more blanks. Yet it is said—and there is evidence in confirmation both from the U.S.A. and from preliminary trials in this country—that the final yield

will not suffer. This is partly because the beets adjoining gaps tend to grow larger. The main reason, however, is that the time of singling exercises a marked influence on yield; and singling by hand is very seldom completed as early as it should be. This mechanical singling may leave a "gappy" result; but it is done at the right time, and the increased yield resulting from this is sufficient to offset the gaps.

Success with this method—which can, of course, be applied to any crop which needs singling—depends on very regular drilling; and the ordinary root drill of the farm is hardly good enough for the purpose. The N.I.A.E. has worked out a more suitable drill mechanism experimentally and is now building it into a drill for field trials. It aims at putting single seeds at regular distances apart, either continuously or in batches, according to whether a root gapper or cross-hoeing is to be used afterwards. If it is successful, the new method may be very widely practised in the future.

DUNG HANDLING.

This problem, perhaps better than any other, illustrates the real difficulty of the agricultural engineer, which is not so much to make implements which will work as to make implements which will fit sufficiently well into the varied circumstances of farming to become commercial propositions. Four distinct types of dung loader have been developed over the last year or two by a process of testing, modification, and re-testing, until each is reasonably efficient from a technical standpoint. It still remains to be seen, however, whether any one of them is destined to become at all universally used in farming. The most straightforward is a dung-loading crane with a self-operating grab, capable of lifting about five hundredweight of dung at a time. This outfit represents roughly a civil engineering approach to the problem—it makes no allowance for farming limitations and simply treats dung as a material to be loaded. But its 16-ft.-high jib would be unsuitable for any kind of covered yard, while even in the open it would be cumbersome to manoeuvre. Another kind of device is the tractor buck-rake, one model of which is shown in Fig. 2. This will load dung pretty quickly, and might easily be adapted to load other materials as well. The main trouble in its case is that when the loaded rake is raised, most of the weight is transferred from the rear wheels of the tractor, and in spite of the counterweights provided to overcome this, the wheels tend to slip when the outfit backs to get the load over the cart. If the surrounds are dry the rake does its job efficiently enough to start with, but sooner or later the tractor has to work over the part of the heap which it has loaded, and there are usually a few inches of slippery dung left behind. As soon as this happens, the device is liable to lose more time in slipping about than it saves over the actual job of loading. Buck-rakes are, however, fairly widely used in the U.S.A., and it

is possible that the balance of the models tested so far over here is capable of improvement. The third device is the Thwaites loader, which in the latest version with built-in engine suffers from none of the disadvantages so far mentioned. The loader consists of a power-driven elevator and winch-operated fork. The fork is first drawn out by hand on to the heap and then drawn in with a load of dung by the winch. The load is discharged automatically on to the elevator, which loads into a cart or trailer continuously, and the fork is then drawn out again by hand for a fresh load. The outfit is compact enough to get into most yards, while, with a bit of ingenuity over placing the outfit, most odd corners can be cleared. In its present form the outfit needs two men in addition to the



Fig 2—*Painter Buck-rake Manure Loader.*

man with the cart. One of them controls the fork while the other has the very light job of operating the winch. A loader of this type has recently been tried out on co-operative lines. It was used to load all the dung on a number of farms near one village, the farmers supplying their own labour and transport and paying 3s. per working hour for the machine. The average output was forty loads per day, and led to the general conclusion that, although it made the work less arduous, it did not greatly increase the output of the labour involved. A new attachment is now available which enables the man controlling the fork also to operate the winch. This should, in theory, nearly double the output per man, but whether it will in fact do so remains to be seen. Actually, with the present form of outfit the fork operator has a fairly exhausting job, and every ten minutes or so is ready to change over with

his colleague on the winch. When there is no longer this second man to change with, the output may fall off. The last kind of device is the so-called Dungledozer. This is a further adaptation of the well-known rotary hoe principle. In this case the rotor is direct-mounted at the rear of a Fordson tractor. It burrows into the heap, chops up the dung and delivers it up an elevator straight on to a cart or dung spreader. In order to maintain adhesion, the tractor is fitted with Rotaped tracks, and this makes the outfit expensive, although the rate of loading is correspondingly high. Indeed, the loading rate is high enough to bring one up against a new difficulty, that of providing enough vehicles to keep the outfit busy. In the only test of those yet carried out which could be said to have given the Dungledozer a chance to show its paces, four tractors and trailers and three horses and carts could hardly keep up with it, although the haul was a short one. Incidentally, these and other tests have shown up the relative efficiency of the ordinary horse and cart over a tractor and trailer in work of this kind. If the situation is an open one the tractor is faster; but if, as is more often the case, there is awkward manoeuvring to be done, the horse vehicle gains more through its quicker turn round than it loses through lower speed.

American-type dung spreaders have been used successfully with all these devices and two British-made models are coming into production. The main criticism of these is that they do not hold big enough loads, and that they are not well adapted to any of the many other transport jobs on the farm.

GRAIN HARVESTING, DRYING, AND STORAGE.

The Oxford Institute imported the first combine-harvester to be demonstrated in this country in 1928, and designed a portable grain drier to go with it. That drier served as the prototype on which all the vertical driers now in use (*i.e.*, the great majority of all farm driers) have since been based. The Institute kept in close touch with combine harvesting and farm grain drying for some years after this, but gradually became less concerned with the combine itself than with the more general problem of large-scale mechanisation (at first confined to the chalk belt) of which it was the main symbol. But the introduction of smaller combines and their very rapid spread northwards and westwards during war-time brought new problems on which the N.I.A.E. has been very actively engaged. One side of the work, on which it is not proposed to dwell here, has been to make a continuous study of combine harvesting as a farming technique, and to guide farmers in applying that technique to heavier crops and in less favourable climatic conditions. Some of this work has been described in a recent publication ('Combine Harvesting in the North, 1943'). On the more technical side, one urgent question has been that of temperature control. All the early users of combines and driers took pains to learn their job, and guided by the experimental work done on

their behalf, were careful not to exceed the recommended maximum air temperature during drying of 140° F. They incurred no risk, and even their malting barley and seed corn suffered no damage. During war-time, however, there have been rather frequent complaints about impairment either of germination or baking qualities, and, as a result, further work on the effects of temperature and rate of drying has had to be undertaken. There is little doubt that the earlier work was soundly done and that the recommendations then made were safe, *provided that they were strictly observed*. But some new-comers to drying were less careful, while others were too busy to keep close enough watch over the less skilled labour available. So as to give a safety margin even in these cases, the recommended temperatures have recently been reduced, while steps are being taken to work out means of thermostatic control.

Two other problems undertaken by the Institute have since merged into one which now shows signs of leading to a more general development not at first contemplated. The first problem was the fairly simple one of designing a smaller and cheaper farm grain drier. There were in commercial production several driers of a size capable of taking the full output of a fairly large combine, but these were unnecessarily elaborate from the standpoint of owners of smaller combines, particularly in southern districts where the full output rarely needed to be dried. A prototype was designed, built and tested, and, mainly as a result of this work, two models of small drier are now on the market. The second problem was that of grain storage, which became more and more urgent as combining spread. It was fairly easy to contrive storage space from bins, silos, or adapted farm buildings; the difficulty was to get the grain in and out without overmuch hand labour. Pneumatic elevation and conveyance was the obvious principle to apply, since it was almost infinitely adjustable to varying circumstances; but existing pneumatic elevators required far too much power. The Institute concentrated on finding the best means of introducing the grain into the airstream so as to conserve power, and quickly arrived at a neat design of nozzle. This made possible an elevator capable of delivering 2 tons of grain per hour through a distance of 60 ft., including a rise of 20 ft., with an expenditure of only 3 h.p.

The two problems began to merge into one when this type of pneumatic elevator was used to elevate the grain into the hopper of the small prototype grain drier, and to transfer grain to and from a subsidiary storage bin placed alongside. The general idea was that the storage bin—which was relatively cheap to build—would hold the produce from a normal day's output of the combine. The small drier was not of sufficient capacity to keep pace with the combine if the latter was working continuously and the grain was really damp. But the surplus could be put into the bin, and, by continuing to work at times when the combine was not cutting (*e.g.*, in the early morning and on unsuitable cutting days), the drier might be able to keep pace. Although the outfit was situated in a northerly district (Askham Bryan) and the season was a par-

ticularly wet one, this idea worked remarkably well in practice. The drier, with a nominal capacity of only 10 cwt. an hour, easily kept pace with the output of a 6-ft. combine, and dried a good deal of grain from farmers' machines as well. Actually, there was rather more to the experiment than this, for the bin was provided with a louvred false bottom for ventilation purposes and the pneumatic elevator arranged so that, when not otherwise in use, it could blow a gentle stream of cold air through whatever grain the bin contained. Although this cold air ventilation did not accomplish much drying, it made possible the safe bulk storage of damp grain for an almost indefinite period. On one occasion the bin held for a fortnight a parcel of 8 tons of grain which started with a moisture content of 23 per cent ; but, due to periodical ventilation, no heating or damage resulted.

A parallel experiment is concerned with the use of ordinary B.C.F. concrete silos for grain storage. A silo was erected in a fairly exposed outside situation and provided with a simple conical roof. In this case the function of the pneumatic elevator was to fill the silo in the first place, and to empty and refill on occasion for the purpose of turning the grain over. Twenty-four tons of wheat at about 15 per cent moisture content were put into the silo in September. At the time of writing (nine months later) the grain is still in as good condition as when it went in.

This kind of work is still being extended : for example, within the last month a new valve has been evolved which makes it possible to introduce grain into the conveyor pipe at any point in the lay-out, without causing any obstruction of the airflow when that particular entry point is not in use. Looking ahead to the future, pneumatic elevators and ventilated bins will certainly lower the capital costs of drying and storage in the wetter districts, and may eventually make driers quite unnecessary in the south.

INSECT PESTS OF 1941.

By A. E. CAMERON, M.A., D.Sc., F.R.S.E.,
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INTRODUCTION.

IN a year which was notable for the consistency of its wetness, coolness, and scanty sunshine there were no unusual pest outbreaks of large proportions to stir the Scottish agricultural world. Such as did occur proved to be locally restricted, and, with one or two exceptions, which will be discussed in the report were concerned with species that are well known and annually recurrent. Indeed, it may be truthfully said that the vagaries of the weather of 1941 proved a greater source of worry to farmers than any damage attributable to pests.

Among the pests of live stock there was one which proved to be of particular interest. The species in question is the common Black Fly, *Simulium ornatum*, about which there are apparently no previous records of its attacking farm animals in Scotland. This lack of information regarding the insect's habits may have been due more to oversight than to a sudden change of its behaviour, since it is known to subsist on the blood of cattle and horses elsewhere. Incidentally, *S. ornatum* was also reported in 1941 as being a source of considerable discomfort to human beings in the environs of Edinburgh.

In the field of crop husbandry the insect which probably created greatest interest was the Greenfly, *Macrosiphum dirhodum*, of the timothy seed crop, which may also be a new pest record for Scotland. Fortunately the outbreak, intense while it lasted, proved to be merely of local significance.

Another Greenfly, *Myzus persicae*, which is chiefly the concern of the market gardener and potato grower in South-East Scotland and discussed in previous reports, gave promise early in the season of repeating its destructiveness of recent years, but just before the infestation of cruciferous and other crops became serious it was checked by insect and fungus parasites in July. On one farm, where the pest invaded a field of strawberries, irreparable damage was done to the blossom in June before the parasites stemmed the attack. Actually the greenfly population of the strawberry crop proved to be a mixed one of *Myzus persicae* and *Capitophorus fragariae*, the Strawberry Aphis, but the latter formed a very small proportion of the mixture and had practically no economic significance.

As was to be expected from the succession of wet autumns of 1941, 1942, and 1943, Leather-jackets again occupied a prominent

place among the insect pests of 1944. Pasture and oats on farms in West Lothian were heavily attacked and suffered severe damage. There were one or two cases of heavy leather-jacket infestation of young sugar-beet, which resulted in such loss that the crops had to be ploughed under.

Possibly because of the greater acreage that has been given over to the cultivation of cereal crops since the outbreak of war, there has apparently been a gradual increase in the incidence of such pests as the Frit Fly, *Oscinella frit*, of oats: the Wheat Bulb Fly of wheat, barley, and rye; and the Wheat Leaf-Miner, *Domyza ambigua*. On Lothian and Berwickshire farms in 1944 the Wheat Leaf-Miner, which heretofore had scarcely been noticed in Scotland, had almost assumed the status of a major pest of the wheat crop.

Among pests of root crops the Beet or Mangold Fly, *Pegomyia betæ*, was a conspicuous enemy of the sugar-beet crop in 1944. The most severe damage was done in June by the maggots of the first generation of the fly, when the young plants had no more than four to six leaves.

BLACK FLIES (*Simuliidae*).

Characters and Habits of Black Flies.—The family to which Black Flies belong is represented in Scotland, according to Edwards,¹ by some twelve species, of which nine are recorded as feeding on the blood of man and domestic animals; as in midges, mosquitoes, and clegs, only the females suck blood.

Black Flies (Figs. 3 and 4) are characterised by their compact form, hump-backed shape, and comparatively short legs. Although of minute size, they are not quite so small as midges, but are smaller than mosquitoes. The wings, which reflect an iridescent sheen, are little less broad than long, with only the veins near the front margin well defined. In the male (Fig. 3), which is darker in colour than the female, the eyes are large and occupy the greater part of the head.

There are few niches in Nature to which insects have not been able to accommodate themselves, and not the least curious and precarious is that in which Black Flies breed—namely, those parts of streams and rivers where the current flows fastest over a rocky or stone-strewn bed, often with fronds of aquatic grasses dipping into the water. Nor need the water be absolutely pure in order to support breeding, for Black Flies are often found in streams polluted with organic and inorganic wastes, provided these are not such as may prove lethal to the larvæ and pupæ, which are readily destroyed by oils in emulsified form.

Black Flies are by no means restricted to the immediate neighbourhood of their breeding sites. Their distribution afield is determined on the one hand by the craving of the females to find suit-

¹ Edwards, F. W., Oldroyd, H., and Smart, J. (1939.) 'British Blood-sucking Flies.' London.

able host animals from which to obtain a blood meal, or the flies may be spread abroad involuntarily by winds of moderate strength. To strong winds, however, they react by seeking the shelter provided by shrubs and other low-growing vegetation.

The activities of Black Flies are always most marked during close, sultry conditions in spring and summer, and it is then that they prove most troublesome to man and stock. Naturally, since the male flies are not interested in blood, they are rarely found with the females around their hosts. If need be, males can be obtained most conveniently by rearing them indoors from pupæ collected from the breeding-places in streams. All that is required is a small covered glass dish into which the pupæ are placed on a piece of moist blotting-paper. The flies begin to emerge from the pupæ

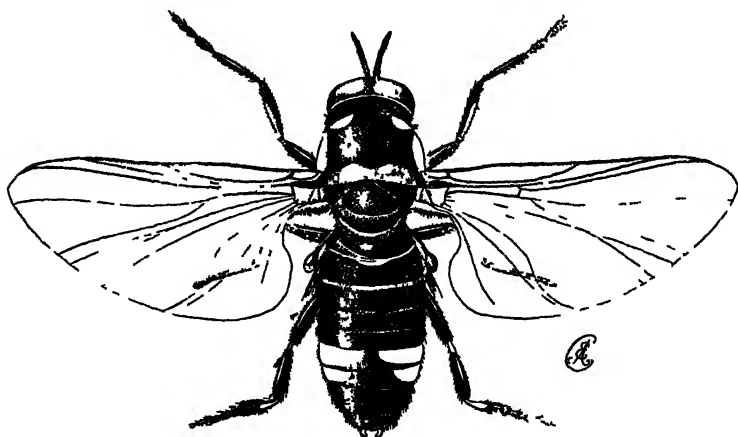


Fig. 3—*Black Fly* Male $\times 20$.

From nature

in a short time, up to five days, depending on the degree of their development.

In the fly populations which frequent stables and byres Black Flies are rarely found. Of their own accord they are not attracted by animal houses, but not infrequently they are brought indoors on horses and cattle, to which they have just previously become firmly attached in the field for the purpose of feeding. Inside, they remain on their hosts only so long as it takes to complete their feeding, when they forthwith escape in flight to the outside through open doors and windows.

To a human being the bite of the Black Fly is at once painful and irritant, and is often accompanied by a red swelling at the site of the bite puncture, which may last for days. That the bites are no less severe to cattle and horses is shown by the restlessness displayed by the latter under attack. From the punctures made by the piercing mouth-parts, blood continues to ooze for some time after the flies have become detached.

The Ornate Black Fly.—Although this insect, scientifically known as *Simulium ornatum*, is common and widely distributed, it has not so far enjoyed a popular name, and for lack of a better it may conveniently be designated the "Ornate Black Fly." Previous to April 1944 it had not apparently been recorded as a troublesome pest of man or beast in Scotland, and its sudden assumption of this rôle is the chief reason for the brief account of black-fly habits presented in this article. It is not suggested that the Ornate Black Fly has recently undergone a change of feeding habits, and the fact that it has not formerly been reported attacking living hosts in Scotland may have been merely a matter of oversight. In this regard it is pertinent to relate that several years ago the Ornate Black Fly was the subject of an investigation



Fig 4 —Black Fly Female $\times 20$

From nature

by Smart,¹ who failed, however, to incriminate it as a blood-sucking species either by observation out-of-doors or by experiment indoors in the laboratory. In England the Ornate Black Fly has long been known as a blood-sucking species, and in 1937 Steward² proved it to be a transmitter of a parasitic worm in cattle.

In 1944 the first reports of its attacks on man came to hand in April from various localities on the outskirts of Edinburgh, and were followed by others later in the spring and summer. Investigation proved that the insect concerned was the Ornate Black Fly. It was not until June that a report was received of a severe fly attack on horses and cattle grazing in a pasture at

¹ Smart, J (1934) "On the Biology of the Black Fly, *Simulium ornatum*, Mg. (Diptera, Simuliidae)." Proc. Roy. Phys. Soc., Vol XXII, Part 4, pp 217-238

² Steward, J S (1937) "The occurrence of *Onchocerca gutturosa* Neumann in Cattle in England, with an account of its Life-history and Development in *Simulium ornatum* Mg." Parasitology, Vol XXIX, pp 212-219

Laurieston. The insect, which again proved to be the Ornate Black Fly, was found attacking the underside of the body of its hosts and causing swelling of the sheath in horses and the udder in cattle. The condition was so severe as to necessitate treatment with a dressing and fly-repellent, and according to the farmer, who first observed the flies on his stock in April, no such attack had previously been observed at his farm.

Life-history of S. ornatum.—*Adult*.—Among Black Flies *S. ornatum* is one of the largest. The *female* is about $\frac{1}{4}$ in. long; its thorax is a dull-greyish black with two conspicuous silvery patches on the shoulders, which are continued back to the base of the wing. Clothing the thorax are numerous small golden appressed hairs; the abdomen is nearly bare, with the tip shining black; the legs are banded with black and yellow. The *male* is slightly smaller than the female, of a velvety black, with the thoracic hairs of a richer golden hue, and the bands of the legs less conspicuous.

Eggs.—The eggs of the Ornate Black Fly are minute, no larger than $\frac{1}{16}$ in. long and slightly less in breadth. In shape they are somewhat triangular with the angles rounded off. Their colour is a pale yellowish-white. Each egg as it is laid is enveloped in a gelatinous secretion, and the aggregate of eggs is cemented together by this substance to form an egg batch of about $\frac{1}{2}$ to $\frac{3}{4}$ in. in diameter. Again, since numerous females select the same sites for egg-laying, the egg batches accumulate, and may even become piled on top of each other, to form extensive egg masses.

Egg-laying would appear to be a precarious process, since the sites chosen for the operation are the water-washed faces of levees, stones or boulders projecting from the water, or leaves of aquatic plants trailing out into the stream, and always where the current is fastest. There would appear to be grave risk of the flies being washed down-stream by the lapping waters, but not only do they take a firm stance but they may even enter the water to oviposit below water-level.

Larva.—The larvæ (Fig. 5) emerge from the eggs in five to six days to find themselves in fast-moving water which requires special adaptations of their structure to retain a secure foothold. These are provided by a peculiar round disc at the hind end of the body armed with tiny grappling hooks which engage the fibres of a silken web spun on the surface of the substratum. Even should the larva become detached, it protects itself against being lost in the current by paying out from its large silk glands a delicate but strong anchoring filament, along which it can return to its original station by a series of looping body movements, in which it uses the grappling hooks of the posterior disc alternately with those of a single stump-like leg process at the anterior end of its body. Normally, the larvæ remain fixed to the breeding sites with their heads directed down-stream, and the stream-line shape helps to reduce the frictional effect of the current on their bodies.

The problem of larval feeding is solved by a special mechanism of two head-fans which are alternately expanded and closed. The fans are essentially rakers composed of a series of comb-like rays,

which sift from the water all particles less than a certain size and deliver them to the mouth. That the larvæ are not selective feeders is shown by the fact that the contents of the gut consist of silt as well as diatoms, desmids, and other organic fragments.

In the course of its growth, which occupies seven to ten weeks in summer, the larva moults its skin possibly five times, and, when

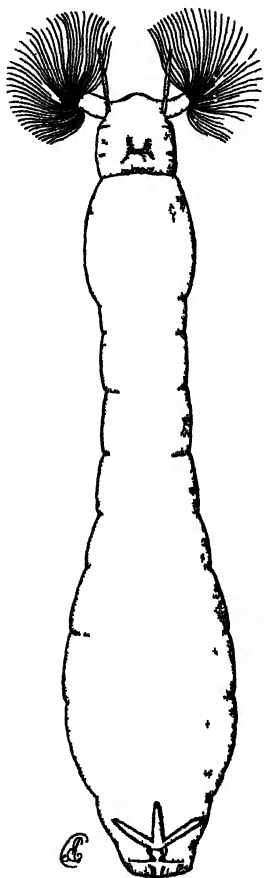


Fig 5—Full-grown larva of Black Fly
x 12

From nature

The head fans used in feeding are shown expanded

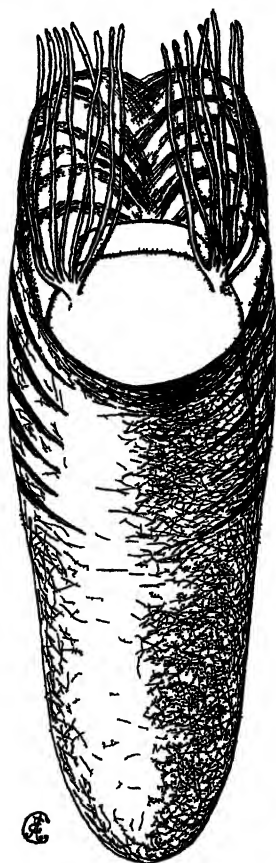


Fig 6—Pupa of Black Fly in its
Cocoon x 20

From nature

The respiratory tubes extend through the open anterior end of the cocoon

full grown, measures about $\frac{1}{2}$ of an inch. Before changing to the resting pupa the larva spins about itself a slipper-like cocoon of roughly woven silk fibres, which is moored to the substratum by its floor and is open in front at the down stream end. With this task accomplished the larva moults for the last time and the pupa appears.

Pupa.—No less than the larva, the pupa (Fig. 6) is likewise faced with the problem of maintaining its stance in the fast-flowing waters of the stream. This it achieves by the protective shelter of its firmly moored cocoon, to the inside of which it is securely attached by a series of anchoring hooklets on the surface of its body, which engage the fibres of the cocoon wall.

The pupa is about half the length of the larva, of a yellowish-brown colour which shows through the transparent wall of the cocoon. Extending forward from the thorax of the pupa are two sets of eight slender filaments, which function as breathing organs in that they extract dissolved air from the water. In the larva, on the other hand, breathing occurs over the whole surface of the body.

The duration of the pupal period is about a week to ten days, during which it gradually becomes darker, and at the end of which the skin splits down the back to release the adult fly, which floats up to the surface enveloped in a bubble of air. Immediately on arrival at the surface it spreads its wings and takes flight.

Number of Annual Generations.—There are at least two generations of the Ornate Black Fly per annum, if not three. The first generation overwinters in the larval stage, which extends to about six months in contrast to the period of seven to ten weeks for summer larvæ. The flies of this first generation are those which are found on the wing in April, the month when it was first reported as molesting human beings in the Edinburgh area in 1944. The second or summer generation of flies appears in June to July, and there may be a third in August to September. Otherwise it is difficult to explain the presence of eggs at the breeding sites, which continue to occur until the middle of October, and hatch to produce the overwintering larvæ.

Control.—The solution of the Black Fly problem lies in the eradication of the larvæ and pupæ in streams by treating the breeding sites with insecticides, of which emulsified oils are known to be toxic. Whilst small streams may be satisfactorily treated, larger streams and rivers are much less so, since the large volume of diluent water quickly reduces the concentration of the insecticide below a toxic level. Even were it permissible to treat infested streams, the practice could not be generally recommended because of the fatal effects of oil-preparations to fish.

So far as live stock is concerned a certain measure of protection against black-fly attack can be provided by dressings of fly-repellents. A comparatively cheap and effective one is made by emulsifying kerosene with soap. Half a pound of soft soap is dissolved in water and added to two gallons of kerosene with thorough stirring. This forms the stock emulsion, and one part is diluted with five parts of water for application to the animal.

For human beings dimethylphthallate, which has proved useful as a repellent for mosquitoes, will no doubt be effective in keeping Black Flies at bay.

ROSE AND GRASS GREENFLY (*Macrosiphum dirhodum*).

Consideration of this Greenfly has been included in the present report because of its appearance as a pest in timothy meadows in Central Scotland in 1944. Here on heavy clay soils timothy is widely grown as a forage crop and for seed. The insect, which was identified by Mr F. Laing, Natural History Museum, South Kensington, alternates between its winter host the rose and its summer herbaceous hosts, which are different kinds of grasses, including timothy. Migration of the Greenfly from the rose to grasses occurs during the summer. On the rose sexual males and females are found in October, but, according to Theobald,¹ wingless asexual forms occur between April and November.

Description.—The *wingless females* on grasses are about $\frac{1}{16}$ in. long, oval in shape, and green to yellowish in colour; eyes are deep red; hind end of the body dusky with two irregular, deep-green, wavy lines down the back. The antennæ and cornicles ("honey tubes") are green, and the short slender legs yellowish-green, with feet dusky. The antennæ are not quite so long as the body.

The asexual *winged females* are slightly smaller than the wingless females, about $\frac{1}{16}$ in. long. They have the same general colour as the latter, only the thorax is buff instead of green, and the hind body has a dusky green stripe or row of dusky spots. The antennæ are brown, green at the base. The eyes are brown, and the veins and stigmal spot of the wing are likewise brown.

The sexual males and females on the rose are slightly smaller than the asexual females on grasses. The males, too, are darker and the females paler than the asexual females. Since the sexual forms are not in themselves destructive, they need not be further discussed here.

Distribution.—The Rose and Grass Greenfly is widely spread over Great Britain, the Continent, and America. In North-East Scotland it has been recorded by Theobald (*loc. cit.*) on the potato.

Damage.—Infestation of timothy meadows was first noted towards the end of March, which supports Theobald's opinion that *M. dirhodum* may spend the winter on grasses as well as on roses.

It was early recognised that the infestation was practically confined to those parts of the timothy crop which had been grown for seed the previous year, and from the beginning of April to the beginning of June it would have been difficult to select a leaf on which greenfly colonies had not become established. The remaining parts of the crop, which had been cut for hay in 1943, were not or very lightly infested.

As the season advanced the infested patches, which were anything from two to four acres in extent, made no substantial growth, and gradually changed from yellowish to reddish-brown with the wilting and death of the foliage.

¹ Theobald, F. V (1926) 'The Plant Lice or Aphididae of Great Britain.' Vol. I., p. 137. London

Control.—(1) *Artificial*.—*M. dirhodum* may be controlled by spraying infested patches with a contact insecticide such as nicotine. The spray should be applied under high pressure to ensure that it will penetrate the dense mat of timothy foliage. Because of their lesser power of penetration, dry insecticidal dusts would not be likely to prove satisfactory in controlling the pest. Whatever treatment is selected, it should be undertaken in spring, when the infestation is first noted.

In the absence of adequate spraying or dusting equipment, one farmer had attempted to stem the attack by pulling a drag-harrow drawn by a tractor through the infested patches of timothy. In a very short time the frame and tines of the harrow became coated with thick layers of Greenflies. This operation was performed on 20th May, when the crop was already showing evident symptoms of exhaustion.

Perhaps the most effective method of dealing with the problem would be to mow the timothy soon after infestation has been diagnosed, remove and burn the cuttings, and follow with a roller to destroy the greenfly residue on the ground.

(2) *Natural*.—At the end of May specimens of a minute braconid parasite (*Aphidius* sp.) was found attacking the Greenfly in the field. By 10th June the parasite had succeeded in checking the spread of the pest and practically eliminated it by the last week of June, when nothing but empty skins of the Greenfly were to be found.

Whilst the parasite by its late seasonal appearance fails to protect the current crop from damage, the benefit of its activities in any one year should be expressed in a reduced population of the pest the following year. It will, therefore, be interesting to discover what degree of greenfly infestation of timothy, if any, will occur in 1945 in the localities where the insect was abundant in 1944.¹

INFESTATION OF STRAWBERRIES BY THE POTATO APHIS (*Myzus persicae*).

With an insect of such polyphagous habits as the Potato Aphis and so widespread in its distribution, it was not altogether surprising to find it infesting a large strawberry plantation of Huxley Giant in the Lothians in 1944, an area which has suffered extensively from its ravages in recent years. Inquiry showed that the strawberry infestation began in the summer of 1943, and was particularly troublesome to the pickers in July of that year. After overwintering on the strawberry plants, *M. persicae* renewed its attacks in April 1944, and in May patches appeared throughout the field, in which the plants remained stunted and failed to thrive. Examination revealed that the aphis was mainly confined to the young blossom trusses, with damaging effect to the subsequent yield of fruit and to the leaves of the developing shoots. Symptoms not unlike those of "leaf-crinkle" became apparent as the season advanced,

¹ The infestation was not repeated in 1945—1946.

but it was not clear whether this was due to virus infection or to the direct effect of the smothering attack of *M. persicae*. In July 1944, with the development of a generation of winged forms, the aphid abandoned the plantation, leaving only a small population of the true Strawberry Aphid (*Capitophorus fragariae*). After this migration the plantation underwent a notable recovery, the plants regaining their vigour and losing all external signs of "leaf-crinkle."

It should be stated that at the height of the infestation in June the plantation was treated with a nicotine dust, but because of the protected position of the aphids at the base of the blossom trusses and in the folds of partly opened leaves, the success of the treatment was only partial. At the present time there is a decided need for improved methods of applying insecticides to plant pests like aphids to ensure that the toxic material is brought into intimate contact with the insects which they are intended to control. With *M. persicae* and aphids of like habits fumigation with toxic gases or aerosols would appear to offer the best chances of effective results.

WHEAT BULB FLY (*Leptohylemyia coarctata*).

In the past few years a considerable number of inquiries concerning damage to winter wheat and rye have been received from Scottish farmers during the spring months, and they were particularly numerous in 1944. In almost all cases the cause of injury proved to be the Wheat Bulb Fly, and this was sometimes associated with wireworm damage.

Life-history.—The Wheat Bulb Fly is peculiar in that it has but one generation per year in contrast to other fly pests of similar habits, such as the Frit Fly of oats with three generations and the Gout Fly of barley and wheat with two. Unlike the two latter also, which lay their eggs on the leaves of their food plants, the Wheat Bulb Fly lays in bare soil quite dissociated from its normal food plants.

The fly which is on the wing from July to September is an insect of inconspicuous habits, which emerges from the soil of wheat, barley, and rye fields, where its pupal cases occur just beneath the surface. Curiously, it does not remain to lay its eggs in the soil of the ripening crop, which apparently offers no attractions to the egg-laying female. As a point of interest it may be mentioned that flies have been reared in the laboratory as early as the first week of June from pupal cases collected in the field at the end of April and beginning of May. Out-of-doors, however, the normal time of emergence of the flies would more likely be the end of June and beginning of July.

The *adult female* is a bristly fly of a brownish-grey colour, with legs reddish-yellow and feet black. The *male* is slightly darker than the female, with the hind part of the body darker than the middle region and the legs almost entirely black. So far as the distinction of the sexes is concerned, this is most readily decided by an examination of the head. In the female the eyes are widely

separated, whereas in the male they almost meet in the middle of the head. As regards size, the fly is about $\frac{1}{2}$ in. long and has a wing-spread of about $\frac{3}{4}$ in. The wings have a yellowish tinge, and the veins of the wing are themselves yellow.

The *egg* is a creamy white, slightly less than $\frac{1}{2}$ in. and laid singly in crevices of bare soil, like those of the Cabbage Root Fly and the Carrot Fly, where they remain unhatched until February, when the maggots emerge to feed on available host plants.

The *larva* is a typical fly maggot about $\frac{3}{8}$ in. when full grown, the hind end of the body gently slanted, and bearing a number of small pointed cone-like tubercles on its margin.

The *pupa* or *chrysalis* is protected by a dark-reddish, oval case in the soil, close to the plants on which the larva has fed and has left when fully fed. The pupal stage lasts for about six weeks in May and June. I have, however, found pupæ as early as the last week of April.

Symptoms of Damage.—Signs of an attack of the Wheat Bulb Fly first appear in the crop in March and become intensified during April, at the end of which damage for the year is complete. In individual infested plants the central leaflet of the shoot turns yellow and withers, and is readily detached by a slight pull with the fingers, when it is seen to be severed at its base—the work of the maggot, which may still be present within the shoot. Tillers are subject to attack just like the parent plant, and each shoot destroyed means the loss of a potential ear. Strong tillering plants are less prone to damage than single-shoot plants, or at least their chances of recovery increase with the number of tillers produced.

It is well to remark that wireworm damage resembles that done by the maggot of the Wheat Bulb Fly; only, in the former, all the leaves of the plant, both central and outer, wilt and die, whilst in the latter the outer leaves retain their normal healthy green colour. The wireworm, by biting through the base of the plant below ground level, causes the death of all the parts above the site of the injury.

Nature of Injury and its Extent.—Injury is confined entirely to wheat and sometimes barley and rye that have been winter sown. Damage in individual plants is traceable to the feeding of the maggot in the central shoot, which results in the destruction of the growing point and effectively inhibits its further growth. Thus, unless tillers are produced and escape attack, an infested crop may become a complete loss.

Experience has shown that the incidence of infestation in different fields is variable. Sometimes it is uniformly distributed and affects the whole field; again it may occur in patches, which gradually become enlarged due to the habit of the maggot of migrating from plant to plant. The cause of this variability is traceable to the discrimination of the fly in selecting its egg-laying sites in soil of light texture, often on knolls. Consequently, where such occurs in patches in a field the infestation will likewise be patchy; should, however, the soil be uniformly light, the result will be a general infestation involving the whole field. But in

itself soil texture does not fully explain variable infestation. As the facts of the life-history show, egg-laying occurs in July and August, two or three months before winter cereals are sown, and a field may then be in fallow after an early or mid-early potato crop has been lifted or actually occupied by a root or late-season potato crop. As regards the latter, the fly tends to lay its eggs in soil that is bare or only scantily covered by foliage. Thus the degree of such cover may also determine the degree of infestation in the succeeding cereal crop.

An interesting case of damage was encountered in one wheat crop which had followed potatoes grown the previous year in variety-trial plots. As the season advanced, patches where wheat bulb fly injury was most marked were observed to coincide with the sites of plots which had borne Arran Pilot—an early variety, lifted early—and with the positions of the paths between the plots. In both, the soil had lain exposed during the season of fly activity in July and August, and had invited concentrated egg-laying in these places.

Risks of completing the Life-cycle.—The peculiar habit of the Wheat Bulb Fly of selecting bare soil for egg-laying must be attended with certain risks regarding the completion of its development. This can only happen where winter wheat, barley, or rye follows fallow, early potatoes, mangolds, and sugar-beet in the rotation; otherwise the maggot must die of starvation soon after it hatches. Should, however, couch-grass, the natural wild food plant, be available to the maggots, they will infest and thrive on this obnoxious weed.

Control.—(1) The first essential in districts prone to wheat bulb fly attack is to avoid sowing winter wheat, barley, or rye after fallow, potatoes, or other crop which does not amply cover the soil in July or August. In Scotland crops of mangolds and sugar-beet of slow growth frequently provide bare soil conditions no less attractive to the fly than exposed soil following the harvesting of an early potato crop.

(2) Winter wheat, barley, and rye should be sown as early as possible to give the plants an opportunity to tiller, and so improve their chances of recovery from an attack.

(3) Where an infestation is diagnosed early in the season (March), the ground should be rolled to consolidate the soil about the roots and promote tillering. To encourage growth, a light dressing of sulphate of ammonia may be applied at the rate of 1 cwt. per acre.

THE MANGOLD FLY (*Pegomyia betæ*).

The Mangold Fly, a pest of spinach, beet, sugar-beet, and mangold, has been markedly on the increase during the past few years in Scotland, and this may be due partly to the increased acreage which has been laid down to sugar-beet as a war-time policy, and partly to the recent practice of replacing swedes by

mangolds in districts where the Swede Midge has rendered the growing of swedes unprofitable.

Kind of Damage.—The symptoms of damage attributable to the Mangold Fly can be readily recognised, since the attack is restricted to the leaves. Soon after the mangold and sugar-beet crops have been singled, pale blisters or blotches (Fig. 8) appear in the leaves; affected plants suffer a check in their growth and may wilt and wither. The blotches gradually increase in extent and may finally involve entire leaves, which shrivel and become desiccated. In severe infestations plants up to the eight-leaf stage and beyond may be destroyed. Generally, however, where the

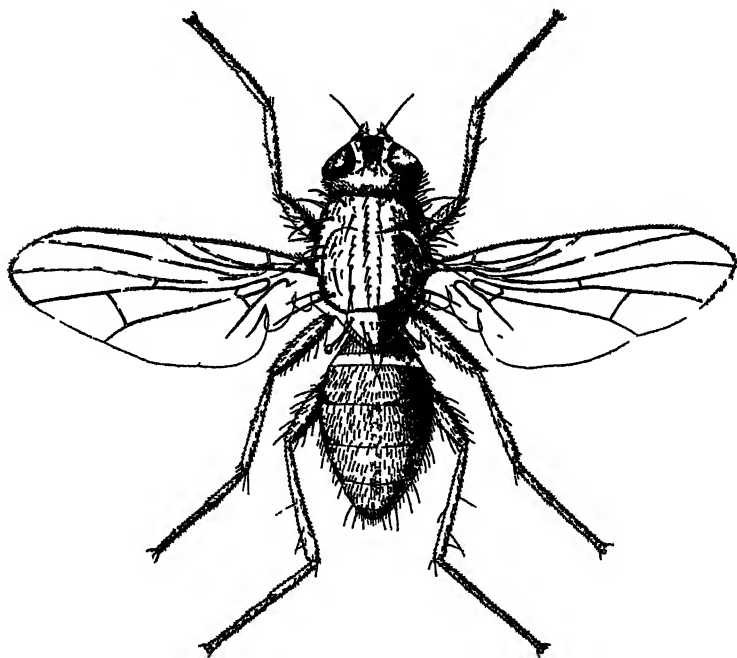


Fig 7.—*Pegomya betae* Mangold Fly 1 male 8

weather conditions are such as to favour rapid growth, mangold and sugar-beet exhibit remarkable powers of resistance, with the result that plants may make an almost complete recovery provided the central shoots escape damage.

Life-history.—In the course of a year the Mangold Fly (Fig. 7), which is of the same general appearance and size as the Cabbage Root Fly, Onion Fly, and Wheat Bulb Fly—all members of the family *Anthomyiidae*—produces three generations at intervals of six to eight weeks. In Scotland the first flies of the season are on the wing in May and June shortly after the mangold and sugar-beet seedlings appear above ground. By the time the plants have reached the four- to six-leaf stage the fly has begun to lay its

chalky, white eggs on the under-surface of the leaves in single rows of four to a dozen or more. The eggs are securely attached to the leaf by a cement substance, and they also cohere closely to each other side by side.

Hatching of the eggs occurs in five to six days, and the minute maggot bores its way through the skin of the leaf and enters the space occupied by the green substance (parenchymatous tissue) between the upper and lower skins. The gallery leading from the



Fig. 8.—Young plant of sugar-beet with leaves blotched by maggots of Mangold Fly.
from nature.

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Advisory Leaflet No 91.

now collapsed egg-shell is at first no broader than the maggot which makes it, but the latter grows as it feeds, and the gallery soon expands into an irregular blotch, containing nothing but the maggots and their excrement. In ten to twelve days the maggot has grown to $\frac{1}{2}$ in. and is now full grown, whereupon it emerges and drops to the ground to pupate in the soil near the surface. A certain minority of the maggots, however, may remain in the blotches and pupate near the margin of the excavated leaves.

Control.—In districts liable to heavy infestation farmers should

concentrate upon the production of strong, vigorous plants by early sowing, application of manurial dressings, and provision of a good tilth. In that farmyard manure proves attractive to the fly, it should be spread and ploughed under in autumn to give it a chance to rot before the flies appear in the spring. To check an early infestation rolling the crop before thinning is useful in crushing the maggots without seriously injuring the plants, provided the ground is not too stony.

Spraying with paraffin emulsion (1 pint paraffin, 1 lb. soft soap, 10 gals. of water) or nicotine sulphate (2½ oz. nicotine sulphate, 1 lb. soft soap, 10 gals. of water) has been recommended for control of the second and third generations, when the foliage more amply covers the ground than it does at the time of activity of the first generation. Whilst contact insecticides such as paraffin emulsion and nicotine-soap provide a fair measure of control of the maggots in the leaf blisters, cost of treatment is a factor which renders their general adoption impractical in so far as the mangold crop is concerned.

The method of treating an infested crop with a poison-bait spray as practised by continental growers of sugar-beet might be worthy of trial in Britain. The bait, which consists of a solution of 4 lb. sodium fluoride and 2 to 3 lb. sugar in 10 gals. of water, is applied as a coarse spray at the rate of 25 gals. per acre of crop in strips about 16 yards apart across the field before the flies have begun to lay their eggs. The flies are attracted to feed on the droplets of the poison bait adhering to the leaves, and the bait may well be applied early in the season to crops growing in fields which were occupied the previous year by infested mangolds or sugar-beet. A second application of the bait to the mangold and sugar-beet crops themselves would take care of the later generations of flies.

LEATHER-JACKETS (*Tipula paludosa* et al.).

The leather-jacket problem in Scotland is one of long standing and crops up periodically, especially in years marked by a succession of wet autumns. A high autumnal precipitation favours the development and survival of the young grubs—susceptible as they are to drought—when they hatch from the eggs laid by the parent Crane Fly in August and September. Reference to the habits of Leather-jackets was made in the 'Transactions' of 1910 and 1914, and the chief reason for this further contribution to the subject is to stress the fact that Scotland is now experiencing a leather-jacket cycle that began four years ago, and may not yet be completed, if the kind of autumn weather bears any correlation to the incidence of the pest. Since the autumn of 1944 was wet like its predecessors of 1941 to 1943, there are grounds for anticipating a continuation of the present infestation in spring and summer of 1945.¹

¹ This forecast has been amply borne out by the experience of farmers throughout the country—22.11.45

In 1944 reports of leather-jacket damage came from various parts of the country, and concerned not only lea pastures and cereal crops on farms, but lawns in city squares and bowling-greens. Symptoms of leather-jacket damage to winter wheat were recognised as early as the end of March and to lea oats at the end of April and beginning of May. Where baiting with the Paris green and bran mixture had been delayed or neglected, whole fields of wheat, oats, and barley were so severely damaged as to necessitate resowing. It cannot be too strongly emphasised that treatment of a field with bait should immediately follow discovery of bare patches perforated by the bore-holes made by the grubs in their nocturnal migrations to the surface to feed. If further conviction is required, exposure of the grubs by slight disturbance of the surface soil with a hand-fork or other convenient tool will readily supply the necessary incentive to protective action.

In parts of West Lothian low-ground pastures that were stripped almost bare produced counts of Leather-jackets in June as high as 64 per square foot, equivalent to a density of $2\frac{1}{2}$ million per acre. Upland pastures proved to be just as heavily infested, and one in particular, at an elevation of 750-780 feet, which had been satisfactorily converted from rough marginal ground three and four years previously by ploughing, harrowing, and reseeded was practically laid bare before the first week of May and rendered useless for grazing; grub bore-holes were everywhere abundantly manifest.

The intensity of leather-jacket infestation of the natural pastures of upland sheep-farms may not be sufficiently realised, but their potential importance as one factor in pasture deterioration may be appreciated by consideration of the high counts of crane-fly eggs in turf samples, mentioned in the 1937 'Transactions,' which averaged 3 million per acre.

WHEAT LEAF-MINER (*Domomyza ambigua*).

Previous to 1944 there would appear to have been no record of damage to cereals by *D. ambigua* in Scotland, and whether this omission is attributable to oversight due to its rarity can only be the subject of speculation. Certainly in the summer of 1944 there was no difficulty in recognising the pest from the blanching and wilting of wheat leaves damaged by the maggot, but various farmers whose opinion was canvassed denied any previous acquaintance with the condition.

Host Plants.—In addition to wheat, which seems to be the commonest host, the Wheat Leaf-miner was noted last year on oats and barley in Scotland, and has been recorded on rye elsewhere. Among wild host plants in Scotland it was noted on Couch-grass, Yorkshire Fog, and Tall Oat-grass, and it is also known to occur on Small-reed Grass and Wall Barley.

Distribution.—*D. ambigua* is widely spread in Europe, Siberia, North Africa, and North America.

Type of Damage.—The maggots of *D. ambigua* burrow in the leaves, devouring the parenchyma as they go, and making a mine broad as the leaf itself and stretching from the tip toward the base for a distance of 6 to 8 in. In heavily infested winter wheat it is rare to find a plant of which some of the leaves are not mined, and although such plants may not be irreparably injured, the damage may be greater than that due to rust and mildew together.

Number of Generations.—Whilst we have no definite information regarding the number of annual generations in Scotland, such evidence as we possess appears to point to the existence of two, the second overwintering as pupæ in the soil.

Control.—Before the question of control could be profitably considered the habits of the pest would require to be intensively investigated. A poison-bait spray similar to that recommended for the control of the Mangold Fly (p. 68) might be applied to susceptible cereal crops just before *D. ambigua* appears on the wing in June, and deep ploughing of infested harvested fields in the autumn or early spring to bury the hibernating puparia might prove effective in frustrating the efforts of the fly to reach the surface when it hatches.

A NEW INSECTICIDE.

During the past year fairly frequent reference has been made in Press articles to a synthetic organic substance, D.D.T., with particular reference to its uses in the control of lice and mosquitoes, so that the abbreviation has become more widely known than the term for which it stands. The substance in question is a complex compound designated by chemists dichloro-diphenyl-trichlorethane, practically unheard of before the war, but to-day recognised as having insecticidal properties of a high order. It is now a matter of common knowledge that D.D.T. was first synthesised by a German chemist in 1874, but it was not until some time previous to 1939 that its possibilities as an insecticide were realised, and in this year a patent covering its use as an insecticide was taken out by the Swiss chemical firm of J. R. Geigy of Basle. Similar patents in favour of this same firm now exist in Britain and America, and it is now manufacturing insecticides containing D.D.T. under the trade names of Neocid, Gesarol, and Gesapon. The first of these is intended for use in lice and mosquito control; the second is of two kinds, one of which is used as a spray and the other as a dust against insect pests of agricultural importance; the third is an emulsion, which, according to preliminary tests, may be useful in controlling root-infesting insects like the Carrot Fly and the Cabbage Root Fly.

Proofs of the insecticidal efficiency of D.D.T. have gradually accumulated as the result of numerous experimental tests on a wide diversity of insects in Switzerland, America, and Britain, and this quite apart from its proved efficacy in reducing human lice and mosquito infestations. In this regard its discovery has

materially helped to relieve conditions created by the shortage, due to the war, of supplies of derris and pyrethrum, which have long been widely used in insect-pest control.

The claim to superiority of D.D.T. over derris and pyrethrum, as well as many inorganic insecticides, does not rest upon its greater toxicity, but upon its marked stability and prolonged residual action, whereby materials—whether it be wall-surfaces, garments, coats of animals, stored products or foliage—sprayed or dusted with D.D.T. remain lethal to insects for several weeks after treatment. Added to this its toxicity to man in concentrations of 0.1 to 0.2 per cent, that are effective for insecticidal purposes, is apparently negligible. Nevertheless, until its exact toxicity to man has been established, D.D.T. should be handled with all due caution, so as to avoid ingestion, inhalation, and absorption of the substance.

The mode of action of D.D.T. on insect and acarine pests is not unlike that of derris and pyrethrum; all are nerve poisons. It has been suggested that D.D.T. reacts on the nerve systems of its insect victims after a preliminary dissolution of the protective lipid layer of the permeable insect cuticle, whereby it penetrates to the underlying nerves; or, more simply, as in flies, it may operate through the superficial sensory organs of the feet. There is evidence, too, that D.D.T. also acts as a stomach insecticide if ingested by insects.

The lethal effect of D.D.T. on insects is less rapid than that of derris and pyrethrum. Following a period of abnormal excitation which may last for two to twelve hours, affected flies turn over on their backs—the so-called “knock-down”—and display spasmodic twitchings of the legs, which gradually become more feeble until death occurs. In beetles (*e.g.*, *Niptus hololeucus*, the Golden Spider Beetle) the “knock-down” takes longer to supervene, and in the interval after exposure they continue to walk around restlessly, but their movements become more and more inco-ordinate, until they, too, finally turn on their backs.

Without underestimating the value of small experimental trials in attempting to decide the potential worth of D.D.T., more data will require to be obtained from field-scale tests on crop and orchard insects before final judgment on its efficacy regarding this class of pests can be passed. It must not, therefore, be assumed that in D.D.T. one will find the answer to all and sundry insect-pest problems and that it will replace standard insecticides of known worth. For example, D.D.T. would seem to be ineffective against Greenfly and Red Spider, the first of which is susceptible to control by nicotine, derris, and pyrethrum, and the second by petroleum-oil washes in winter and lime-sulphur in summer. Again, in the control of Mange Mites of domestic animals, D.D.T. is not likely to displace sulphur compounds.

Because of war exigencies, on no other insecticide has so much work been concentrated in such a brief space of time, and this intensive investigation will no doubt serve as an incentive to research on other insecticides, the physiological action of many of which on insects is but imperfectly known. At the same time D.D.T.

is by no means the only synthetic organic substance of recent origin on which research is proceeding, and one of these, benzenehexachloride, known in Britain as "Gammexane," is said to have given good results in the control of flea beetle. In this regard it must be noted that whilst there are many chemical substances lethal to insects, only those are worthy of consideration—where plant pests are concerned—which have but slight or no phytocidal action. Indeed, possible toxicity to the living host, plant or animal, is the important limiting factor in the quest for and adoption of new insecticides.

There is just one important point in the use of D.D.T. against crop and orchard pests which must be considered, and that is its possible effects on two classes of beneficial insects: (1) parasites and predators, (2) bees. As is well known, the former help to maintain equilibrium in the insect world and are particularly important in the natural control of insect outbreaks, and the latter again are Nature's chief agent in the pollination of orchard blossom. There is just the risk that these two classes of useful insects may be adversely affected by D.D.T., all the more so because of its stability and prolonged residual toxic effects.

For those who may be interested in obtaining more detailed information on experiments with D.D.T., reference should be made to the series of articles by Annand and his colleagues of the U.S. Bureau of Entomology, which were published in the 'Journal of Economic Entomology,' vol. 37, No. 1, in 1944.

At present all available supplies of D.D.T. are controlled by the Government, and there is small prospect of its being placed on the market until the end of hostilities is reached.

Whilst on the question of insecticides it may be pertinent to refer to a new method¹ of their application, which has been recently evolved in America with a view to increasing their efficiency. Here the insecticide is dissolved in a liquefied gas kept under considerable pressure in a container from which it is released into the air through a small aperture. The sudden reduction of pressure causes the solution to boil vigorously and disperses the insecticide as a colloidal suspension in the form of an aerosol (smoke or fog). Thus the insecticide remains suspended and active for a much longer period than a spray, and its efficiency is thereby increased. The liquid gases commonly used in aerosols are the refrigerants dichlorodifluoromethane (Freon—12) and methyl chloride as solvents for the insecticide pyrethrum; but nicotine, derris, thiocyanates, and D.D.T. have also been tried in aerosol form.

¹ Goodhue, L. D. (1944). "Insecticidal Aerosols." J. Econ. Ent. Vol. 37, No. 3, pp. 338-341.

AGRICULTURAL RESEARCH IN SCOTLAND IN 1944.

BEING A BRIEF SUMMARY OF THE WORK AT THE
SCOTTISH AGRICULTURAL RESEARCH STATIONS
AND AGRICULTURAL AND VETERINARY COLLEGES
DURING THE YEAR.

*Readers desiring fuller information on any of the subjects mentioned
should write to the Director of the Station or Principal of the
College at which the investigation is being carried out.*

INSTITUTE OF ANIMAL GENETICS.

UNIVERSITY OF EDINBURGH, WEST MAINS ROAD.

Cattle.—Studies of the size, structure, and other characteristics of various breeds of cattle have been made with a view to examining the efficiency of the various techniques of improvement such as artificial insemination, bull-licensing, and milk-recording. The high proportion of unproven sires and dams, the widespread movements of sires and the small size and short duration of many herds, constitute a serious hindrance to securing the full value from measures for improvement. Disease control is an obvious first step in a long-term breeding policy, but when this is achieved it becomes of importance to determine what proportion of old cows should be retained, and what proportion discarded to make room for the next generation. Some breeders have a very large number of old cows, while others keep their herds young. From the genetical point of view it would appear desirable to reduce the number of cows with more than four lactations to the minimum necessary for bull production in order to lessen the intervals between generations. This presupposes that the selection of sires is sufficiently effective to raise and not lower average milk production.

The long-term breeding experiment on the inheritance of milk production has been continued along with observations on the effect of various management and environmental factors on milk production.

Pigs.—The inbreeding and crossing of Large White, Wessex, and Gloucester Old Spot pigs has been maintained with interesting results in respect of colour, temperament, and productive qualities.

Poultry.—The isolation of characters relating to production in the Brown Leghorn flock at the Institute by breeding is being continued. Various crosses between inbred lines have been made, and interesting results on the question of mortality due primarily to constitutional weaknesses have been obtained.

ANIMAL DISEASES RESEARCH ASSOCIATION.

MOREDUN INSTITUTE, GILBERTON, MIDLOTHIAN.

The investigations upon which the Association has been engaged in recent years are being continued. These include grass sickness in horses, lactation tetany in cows, white scour and allied diseases in calves, scrapie, enzootic abortion in ewes, tick pyæmia, and pining in sheep and young cattle.

The systematic investigation of parturient redwater in cows is being continued, and the co-operative programme of research upon the important problem of mastitis in dairy cows is being actively pursued.

THE ROWETT RESEARCH INSTITUTE.

BUCKSBURN, ABERDEEN.

The main lines of research carried out in the year 1944 were :—

1. *Influence of feeding of the mother on the viability and rate of growth of the offspring.*

This work, to which reference was made in the previous report, has been extended. It has been shown that the effect of the diet of the mother, particularly during pregnancy and lactation, may have a marked effect on the health and progress of the young during the suckling period. This is especially true in relation to the vitamin content of the ration where an imbalance may have a definite detrimental effect. There also appears to be a relationship between the amounts of certain mineral constituents of the diet and the utilisation of certain vitamin constituents.

2. *Iodine.*

This work carried out on behalf of the Committee of the Medical Research Council has been continued and extended, and the preliminary findings have been amplified. By means of balance experiments the influence of varying amounts of Ca, Mg, and F in the diet on the utilisation of iodine in the diet, and the consequent effect on the structure and function of the thyroid, have been studied.

3. *The nutritive value of oatmeal.*

A comprehensive study of the vitamin B₁ content of the oat has been made. The effect of variety, and climatic and geographical factors have been studied. Certain differences have been noted between varieties, but these differences are almost within the ranges of values found for specific varieties. It has been found that in the process of conversion of the oats into oatmeal there is a definite loss of vitamin B₁ in the kiln-drying prior to milling. In general, the actual percentage of vitamin B₁ is equal to that of the kiln-dried oats on a dry matter basis. A study was made of the vitamin B₁ content in the developing grain up to maturity and harvesting, and changes in the stook and in the stack were studied.

Detailed studies are being conducted of the utilisation of the phosphorus in oatmeal, with particular reference to the phytin phosphorus, by the pig.

4. *Losses in potatoes during storage.*

Changes in the dry matter and vitamin C content of the potato during storage indoors and outdoors in different types of pit, with and without ventilation, were investigated, and an examination was made in conjunction with the North of Scotland College of Agriculture of the extent and types of rot at different stages of the storage period and under the different conditions of storage.

5. *Experimental Farm.*

The Duthie Experimental Stock Farm belonging to the Institute and the Craibstone Farm belonging to the North of Scotland College of Agriculture continued throughout the year to be run as one unit mainly for the purpose of producing food—viz., milk, potatoes, and grain. Demonstrations were held of implements and methods of cultivation with a view to increasing production and saving man-power.

THE SCOTTISH PLANT-BREEDING STATION.

CRAIGS HOUSE, CORSTORPHINE, EDINBURGH.

Experimental work on the breeding of cereals, potatoes, herbage plants, swedes, and other Brassicas is in progress at the Station. Each year it is customary to describe briefly in the 'Transactions' one section of the work, and on this occasion the breeding experiments to improve swedes will be reviewed.

The method of propagating swedes from single, selected plants by obtaining self-fertilised seed in pollen-proof bags, is convenient for the maintenance of numerous experimental lines and also for the fixing of characters in strains derived from crosses. But it has

drawbacks, in that the supply of seed is too small to represent the strain in large trials, and that such strict inbreeding places the strain at a disadvantage in comparisons with strains that have been mass-bred, like the commercial varieties. For although there is probably much self-fertilisation in swedes when seeded in a group, yet a certain amount of crossing, even between closely related plants, may give an added vigour to the progeny. It is therefore desirable to mass-multiply promising strains in natural isolation to provide seed for larger and more comparable tests.

Since 1940 strains bred from crosses between different types of swede have become sufficiently true-breeding to assess their possible value or uses. Unfortunately during that period the swede break has had to be reduced in size in favour of sugar-beet and other food crops, so that extensive trials could not be conducted. Nevertheless, by observing plots of the strains grouped according to their relationships, it has been possible not only to discard many inferior lines, but also to decide whether crosses between certain types of swede are likely to be profitable. The more promising strains are now being intensively selected and bred, and arrangements are being made to test them on a field scale when possible.

Finger-and-toe is the most important disease of swedes, which can be alleviated to some extent by breeding. There is no doubt that seed-growers have obtained a certain degree of resistance in certain varieties by mass-selection, but there seems less prospect of obtaining strains with immunity or any very high degree of resistance. It is hoped, however, to select and, if possible, to concentrate such hereditary factors as there may be. A small area of highly infected land has been used for testing strains and selecting apparently resistant plants. This method has not proved very satisfactory because the severity of the attack varies enormously in different seasons, so that one year all the strains may be killed and another they may escape with little damage. The distribution of the organism in the soil is also erratic; depending probably on moisture and tilth. A plant which shows no disease may merely have occupied a site where the organism was inactive. Considerable use is now being made of a seedling test devised by mycologists, the argument for which is that if a swede can resist finger-and-toe during the seedling stage, any subsequent infection, though causing nodules, will not greatly affect the yield. Seed is sown, or seedlings are pricked out, in sterilised soil in shallow wooden boxes. Infection is then evenly applied by watering with an extract from diseased nodules, and some weeks later the young plants are examined and those showing no nodules are transplanted to pots for breeding. The difficulty from the breeding point of view is to keep plants alive after the test. The root system is naturally damaged when the examination is made, and after this check the plant has a long period of inactivity before it flowers next spring. It may therefore fall prey to a later attack of finger-and-toe or other disease while in a weakened state. However, strains are now being bred from tested seedlings.

During the last few years the spread of *Phorbia floralis*, the swede root fly, has become a serious trouble at the Station. It is a relative of, and not unlike, the cabbage root fly, but lays its eggs later in the season in the soil beside the young root. When the bulb has developed the maggots hatch out and bore into the bottom of the swede. There is nothing so far to suggest that one type of swede may be more resistant to attack than another. In one trial a strain with very broad bulbs had 15 per cent of its plants attacked, while another with exceptionally small roots only 5 per cent; the rest being attacked to the extent of 10 per cent. This suggests that the area of bulb in contact with the soil determined the opportunity for attack.

Winter hardiness is a subject which is receiving attention, but recent work has had to be carried out on a small scale to avoid undue loss of foodstuff. In the mild winter of 1943-44, some plots of various types of swede were left growing till February and suffered very little damage from frost. In general, the "hard" types stood the winter best, but there were cases of poor resistance in strains of both "hard" and "soft" types. An exceptionally severe period in the winter of 1944-45 showed greater differences. A trial had been laid out, and part of each plot was lifted in December, while a small area was left till February. Two "soft" strains which yielded best in December were almost completely destroyed by frost, and two "hard" strains which had not yielded so heavily showed considerable resistance. The other two strains were main-crops which were intermediate both for yield in December and for resistance in February. Among the observations on this trial it may be mentioned that the "soft" types suffered most from soft rot in November, while harder types which were liable to split showed more decay in splits or hollows.

THE HANNAH DAIRY RESEARCH INSTITUTE.

KIRKHILL, Ayr.

During the sixteen years of its existence the Institute has made over 200 contributions to scientific literature in the form of bulletins, special reports, or papers in well-known scientific and technical journals. During the past year a detailed list of these publications has been printed and can be obtained from the Secretary of the Institute.

In the past year work has been continued on the following subjects:—

Farm Self-sufficiency.—A large-scale investigation was begun in the early days of the war to find to what extent the Institute farm could achieve self-sufficiency in feeding-stuffs. This is naturally a long-term investigation which still requires further time for its completion. One fact which emerged very clearly from the early work was that for self-sufficiency to be attained it was advisable

to grow high protein crops to supplement the protein obtained from grazing and ensiling. A study has therefore been made of the conditions best suited for the growing of beans in the south-west of Scotland. Detailed plot experiments have also been begun with the object of finding the optimum conditions for obtaining high protein herbage for conservation.

Diet and Milk Yield.—A discovery was made in Germany a few years before the war that when certain proteins are treated with iodine they can act like the hormone thyroxine in causing an increase in the metabolic rate of animals. With lactating cows under certain conditions these thyroproteins cause an increase in the yield of milk and of butterfat. The suggestion was made both in America and in this country that thyroprotein might be used to increase milk and butterfat production. It is not yet known, however, to what extent the animals are affected by such treatment. The specially constructed metabolism house, which is available at the Institute, has therefore been used to find how the general metabolism of lactating cows is affected when their milk yield is increased by thyroxine treatment.

Ruminant Digestion.—At one time it was generally believed that the main functions of rumination were maceration of the feeding-stuffs and cellulose digestion. It is now realised, however, that at least one vitamin may be destroyed in the rumen and several others synthesised, and that the nature of the nitrogenous constituents of the diet may also be materially altered during their period in the rumen. Extensive experiments on ruminant digestion have therefore been carried out during the past few years, with particular reference to the possibility of protein synthesis from simple nitrogenous substances in the rumen. A thorough knowledge of the changes which take place in the nitrogenous constituents of the diet will make a most valuable addition to existing information on the protein requirements of dairy cows.

The Ventilation of Farm Buildings.—Work on the ventilation of farm buildings which was begun some years ago has been continued during the past year.

The Diseases of Dairy Cattle.—Research into some of the more fundamental aspects of mastitis has been continued, with particular reference to the control of the disease and its treatment. This work is being carried out in co-operation with the Agricultural Research Council and the Scottish Board of Veterinary Science. Simpler methods of diagnosis have been worked out, and are being applied in the field. Work on the prevention of mastitis other than contagious is also in progress. The Institute has continued to co-operate in the diagnosis of contagious abortion and in the investigation of white scour in calves.

Dried Milk.—Experiments with the object of extending the storage life of dried milk, either by altering the pre-heating tem-

perature of the liquid milk or by the addition of anti-oxidants, have been continued during the past year. The work has been carried out in conjunction with two other Research Institutes, and has resulted in the storage life in temperate climates of good quality spray-dried full cream milk being extended from a few months to about two years.

THE MACAULAY INSTITUTE FOR SOIL RESEARCH.

CRAIGIEBUCKLER, ABERDEEN.

In view of the continued importance of using to the best advantage the supplies of lime and fertilisers available, particular attention continues to be given to advisory work and problems of immediate importance in agriculture. Close co-operation has again been maintained with various other institutions. The work carried out during the year may be summarised as follows :—

1. *Advisory Work*.—Approximately 4100 samples of soil have been tested, and advisory reports on the treatments likely to be most suitable for the areas in question have been issued. As has been emphasised in previous years, deficiencies of lime and phosphate are widespread.

2. *General Soil Fertility Investigations*.—General experimental work on the effects of lime and phosphate has been continued, with special reference to the study of phosphate fixation and the placement of fertilisers. Experiments are also being carried out with blast furnace slags and with fertilisers in granular and concentrated forms, and work on crushed biotite schist as a source of potash has been continued.

3. *Soil Surveys and Classification*.—A primary 6-inch to 1-mile survey of the neighbourhood of Aberdeen has been begun and an area of some 26 square miles covered. The reconnaissance survey (2·5 inches to 1 mile) has been extended to a further 80 square miles of Aberdeenshire and to some 200 square miles of an area embracing parts of Stirlingshire, Clackmannanshire, West Lothian, and Fife-shire. Detailed surveys of one or two farms, and of a lake marl deposit in Caithness, have been made for special purposes. Mineralogical examination of the fine sand fractions from soils and drifts has been closely linked with the soil survey.

4. *Soil Organic Matter and Peat*.—Field work has been continued in connection with the survey of the peat resources of Scotland undertaken in collaboration with H.M. Geological Survey. Horticultural work has consisted of tests of the properties of various peats as soil constituents and of trials of some tomato species for semi-outdoor work. Field experiments on peat as a substitute for farmyard manure have also been continued, and laboratory work

has included the study of methods of characterising peat types, together with physico-chemical investigation of various types of organic matter.

5. *Spectrographic Work*.—Determinations of the trace element contents of soils and plant materials have been continued, and about 7000 samples have been examined. An attempt is being made to relate the incidence of certain diseases in stock directly to the trace element contents of the soil. Research into methods of spectrographic analysis has also been continued.

6. *X-ray Work*.—Fundamental research on the pure clay minerals (including a good deal of work on montmorillonites) and intensive investigation of a few selected soil clays have been carried out.

7. *Soil Drainage and Other Investigations*.—Analytical work on the composition of the drainage waters from the Craibstone lysimeters has been continued, as has joint work with other bodies—e.g., the investigation of various stock disease problems in collaboration with the Animal Diseases Research Association; the completion of the limestone survey with H.M. Geological Survey; and the study of problems of tree nutrition with the Forestry Commission.

EDINBURGH AND EAST OF SCOTLAND COLLEGE OF AGRICULTURE.

AGRICULTURAL BACTERIOLOGY.

Mastitis in Dairy Cows.—Four herds have now been cleared of infection due to *Strep. agalactiae*. A further investigation of the incidence in relation to season and stage of lactation of new infections caused by this organism has been begun. Additional evidence confirms the low incidence of *Strep. agalactiae* infection in suckled herds.

Failures in Field Beans.—In the cases referred to in last year's report the plants were pale and stunted and showed a reduced number or complete absence of pods as well as few or no nodules and a more or less pronounced blackening of the roots. The soils on which failures occurred were generally the more acid types with a relatively low content of replaceable calcium.

Utilisation of Surplus Straw.—Preliminary experiments on the ploughing in of undersown green manure crops with a long cereal stubble indicate that it will be necessary to study in detail such matters as the nature and time of sowing of the undersown crop, treatment after harvest, date of ploughing, &c.

AGRICULTURAL BOTANY.

Pasture reseedling trials were continued, live-weight increases of stock grazing the plots being recorded as in previous years.

Trials were conducted at a number of centres, in co-operation with the Advisory Bacteriology Department, to obtain information regarding the relative values of certain grasses and legumes for undersowing in cereals, with the primary object of providing a nitrogen-rich material to plough down with the stubble.

A survey of the incidence of "Eyespot" disease in barley crops was carried out, with particular reference to the effect of previous cropping, and the relation of infection to lodging.

Investigations were conducted, in collaboration with the Advisory Bacteriologist, into the causes of certain failures of field beans.

AGRICULTURAL CHEMISTRY.

The Chemistry Department dealt with 8187 samples of soils, fertilisers, and feeding-stuffs. The demand for soil analysis has continued to increase, due largely to the systematic sampling of the fields in certain counties and to a more general desire to ensure successful crops where doubt exists as to the condition of the soil. Both beet-sugar and flax factories, for example, are making use of this advisory service. Of the 6107 soil samples examined, 272 were from experimental areas concerned with the growing of beans, reseedling of grassland, phosphatic manuring, and trace element deficiencies. This last question is also being studied through the analysis of plant tissue in an attempt to correlate visual symptoms with chemical composition.

The problem of maintaining the level of organic matter in the soil is also receiving attention in investigations on the composting of straw and on the return of organic matter to the soil in the form of plant leaves and roots.

The investigation of the changes in the sugar content of potato tubers during storage has been continued, but the results for at least one other season are required to confirm the interesting data already collected. With respect to silage, a study has been made of the discrepancies between the nitrogen figures determined on the fresh and oven-dried samples. The differences are small where the silage has been well made, but where the preservation has been indifferent there is a serious loss of volatile nitrogenous compounds on drying. The examinations of silage crops during the growing season has confirmed previous observations on the rapid fall in protein content at or about the time of emergence of the ears.

AGRICULTURAL ENTOMOLOGY.

Sheep Tick Investigation.—As a result of a further year's work, it has been found that the period of development of the sheep tick

on hill-pastures from the egg to the adult stage, which was previously considered to be a matter of a year to eighteen months, is not less than three years. Much useful information on the activities of the tick, with reference to its environment on pastures as well as to its animal hosts, has been acquired in the course of the investigation.

D.D.T. in Fly Control.—At the request of the Agricultural Research Council, an experiment was made in the byre of a dairy farm with a view to discovering the efficacy of the new insecticide D.D.T. in controlling the troublesome Stable Fly. The walls of the byre were sprayed with Guesarol E, the spray containing 0.1 per cent D.D.T. The results achieved proved satisfactory.

Other Investigations.—The Department of Advisory Entomology is also engaged in investigating Greenfly attack on market garden and other crops, the factors which determine periodic outbreaks of the Antler Moth on hill-pastures, Carrot Fly, and insect pests of the raspberry crop.

VETERINARY INVESTIGATIONS.

Further work on enzootic abortion in ewes included bacteriological examinations, transmission experiments, and feeding trials with iodinated protein.

Trials of phenothiazine-salt mixtures were continued in collaboration with the University Zoology Department.

Other field investigations included trials of "orf" vaccine, sheep-dipping trials with "666," and trials of a vaccine against sheep pneumonia.

THE NORTH OF SCOTLAND COLLEGE OF AGRICULTURE.

ABERDEEN.

The following are examples of the kind of experimental work being done. They are mainly in connection with the advisory services.

Hill-grazing.—Large-scale experiments have been done on the improvement and management of hill-grazing. Various strains of pasture plants and various methods of improving the soil have been tested under different conditions. The results of previous work have been applied at Glensaugh Sheep Station and in Inverness-shire. In each case an area of heather hill was fenced off, and on a portion of the area the herbage improved by ploughing, manuring, and direct reseedling. The new pasture was grazed in summer by cattle, and the grazing controlled so that a sward would be at its

maximum nutritive value for winter feed for sheep, the succulent grass being used as a complement to the heather remaining in the unploughed area. These experiments show great promise for increasing production of both sheep and store cattle in the hills.

Cropping.—A study is being made of the control of the Blind Seed disease of ryegrass which is most prevalent in seed saved in cool wet summers from thin crops.

Surveys are being made of the distribution and severity of cereal plant diseases in the College area.

In view of the importance of tuber diseases work has been done on Blight control, haulm killing, and on the influence of different methods of storage. Trials with different sprays for killing potato haulms have shown that certain tar distillate fractions in 10 per cent emulsion are as efficient as sulphuric acid.

Animal Diseases.—Work on the ætiology of bovine and hæmoglobinæmia has continued. A further investigation is in progress into diseases causing scouring and high mortality in young cattle in certain seaboard areas. This work includes helminthological examinations which are yielding interesting data.

Research on the relation of the thyroid gland to disease is in progress.

Herd-testing and examination of material from clinical cases of mastitis are being continued, and the results emphasise the complicated nature of the problem and the great importance of byre hygiene in controlling the disease.

External Parasites.—A study of the life-history and methods of controlling external parasites is being continued. Experiments on tick eradication by dipping, spraying, and smearing and by heather-burning, drainage, and improved management are in progress. The insecticide D.D.T. has given promising results.

THE WEST OF SCOTLAND AGRICULTURAL COLLEGE.

MILK UTILISATION DEPARTMENT.

Graded Milks.—The presence of coliform bacteria in graded farm milk supplies of very low bacterial count has been investigated. Particular attention has been given to the influence of farm water supplies as a possible source of the coliform organisms. The use of unsuitable water in the rinsing of the milking units and pails after evening milking has been found responsible in some cases for contamination of the milking machines when used at the following morning milking.

In one survey during the autumn of 1944 only six farm supplies of water out of a total of thirty subjected to appropriate bacteriological examination could be regarded as satisfactory for dairy

purposes. The twenty-four faulty water supplies showed a varying degree of coliform contamination, in many cases of very alarming character.

Dairy Products.—Many samples of slow churning creams, poor quality butters, inferior rennets, and faulty cheese have been examined.

A striking case of difficulty in the firming of cheese curd due to the presence of a bad mastitis outbreak, hitherto not recognised by the herd-owner, was corrected by the addition of calcium chloride to the milk and by the use of an increased amount of rennet in the cheese-making process.

Two cases of particular interest and involving many cheeses were (a) defective flavour accompanied by a markedly open texture in the output of two creameries, and (b) a pronounced blackening of the white cheese in another creamery. Extensive and intensive investigation of these defects of direct economic importance has been carried on.

Of the two creameries producing the open-textured cheese, which as a result were degraded on official inspection, one creamery used raw milk and the other used milk which had been subjected to a limited pasteurisation. The modified heat treatment failed entirely to eradicate the trouble, which was traced to the presence of a sporing organism. The defect was found to be influenced by the temperature of the cheese-curing.

The colour defect (b) developed late in the curing of raw milk cheese which had all been graded first grade, being highly satisfactory in flavour, body, and texture. The defective cheese, when cut across during retail marketing, presented a sooty appearance on the freshly cut surface. Examination of the blackened areas showed the presence of a bacillus not normally found in cheese, and attempts are in progress to make this organism produce a black pigment similar to that found in the cheese.

ANIMAL HUSBANDRY DEPARTMENT.

Artificial Insemination.—The Artificial Insemination Committee, appointed in May 1943, at a meeting organised by the Officer at Waterside, established in June 1944 "The Fenwick and Kilmarnock Cattle Breeders' Society" under the Friendly Societies Act. Farmers in North Ayrshire within a ten-mile radius of Fenwick allocated over 2200 cows for insemination by the Society's bulls. The new Society is the first of its kind in Scotland, and its centre will be the official Artificial Insemination Station in Scotland.

Experimental work has been carried out on the preservation of bull semen using Phillips' egg yolk-phosphate and egg yolk-citrate buffer solutions. Over 50 per cent motility has been maintained in samples stored for nine days. Two of the four cows inseminated with 1 c.c. of samples diluted 1:20, which had been stored for six days, have given birth to heifer calves.

Calf Nutrition.—Two April calves were reared satisfactorily from three days of age to eight weeks on skim milk plus graded doses of vitamin supplements. One calf born in May was reared successfully on skim milk alone. Two calves born in June also progressed normally on the unsupplemented diet. Analyses of the blood plasma of these calves at fourteen-day intervals showed that the vitamin C content remained at a high level—over 0.15 mg. ascorbic acid per 100 ml.—while they remained on experiment. Further work is in progress.

Fertility in Hill Cattle.—The rejection of all bulls producing semen of low fertility has resulted in little improvement in the fertility of hill cattle. Preliminary investigations in certain herds and their grazings showed that a mineral deficiency in the diet might account for the poor calf crops.

Two mineral mixtures, high phosphate and low phosphate-high calcium, were distributed at the beginning of June 1944 on certain Perthshire grazings where the breeding records of the animals were poor. The high phosphate mixture is being fed on three grazings, the low phosphate-high calcium on three other grazings, while a seventh group acts as a control and receives no mineral supplement. The total number of cattle on experiment is 250. The grazings appear to be grossly deficient, since the mineral groups consumed over two tons of the mineral supplements during the first three weeks of the experiment. The full calving records of the groups will show if phosphate deficiency in Scottish pastures is as great a problem as it is in South Africa and certain other countries of the world.

Fertility in Hill Sheep.—Experiments have been continued on the effect of supplementing the diet of the ewes with cobalt in the autumn on the fertility of the flock. On two farms in Perthshire (2050 ewes) an experiment was carried out to determine the response on farms which lie outside the recognised vintish and pining areas. Results similar to those previously reported for vintish grazings were obtained. Thirty per cent barrenness in the ewe flock dropped to 4 per cent, while lambing, which had been very protracted during the previous thirty-three years, was completed by the beginning of May.

A large-scale experiment is now being conducted on 106 farms in the West of Scotland to determine all those districts where anæstrus due to cobalt deficiency causes infertility in hill flocks. The experimental farms are distributed in the following counties of the College area: Argyll, 21; The Isles, 11; Perth, Stirling, and Dumbarton, 11; Ayr, Renfrew, and Bute, 28; Lanark and Dumfries, 14; Kirkcudbright and Wigtown, 10.

DDT (dichlorodiphenyltrichloroethane) and Fly Infestation of Byres and Piggeries.—Under the auspices of the Agricultural Research Council the department co-operated with eleven other centres in Great Britain in experiments on the value of DDT for

the control of fly infestation in farm buildings. DDT is a white powder which is absorbed by the feet of the fly and then causes a fatal paralysis. When a very dilute suspension is painted on walls, insects which alight on the treated surface will die within twenty-four hours. The lethal effect may last for several weeks or even months following the first and only application. It is non-toxic to farm livestock when fed by mouth in large quantities, when rubbed into the skin, or when injected into the skin or beneath the eye.

A double partition was erected on either side of the transverse gangway of the farm piggery, one-half of which received four coatings of a 2 per cent aqueous suspension of DDT on 9th and 10th August. It was found that this treatment was effective in reducing fly numbers for five weeks, when the numbers again became identical in the two halves. It appears that with the constant reinfestation through open windows and doors, control can never be 100 per cent effective. Similar treatment of premises at the Dairy School where screened windows and ventilators prevented flies reinfesting the buildings was entirely successful. While spraying the dairy cow with DDT does not reduce her fly infestation appreciably, it was shown in the farrowing house that a single application of the spray to nine infested sows gave complete control of pig-lice over a period of eight weeks.

ROYAL (DICK) VETERINARY COLLEGE.

EDINBURGH.

PATHOLOGY DEPARTMENT.

The analysis of laboratory records has been completed, and articles dealing with the incidence of disease over a period of twenty-five years are now in course of publication.

Bacteriology Section.—The examination of the pathogenicity and toxin production of hæmolytic streptococci has been continued. Two hundred strains are under review, and promising results have been obtained in the prevention of streptococcal infections in breeding kennels.

Pathology Section.—Bovine mastitis and bovine tuberculosis have continued to be investigated in conjunction with the Animal Diseases Research Association, East of Scotland College of Agriculture, and the West of Scotland College of Agriculture. A critical study of the normal structure of the bovine udder has been carried out and is awaiting publication. The correlation of the pathological changes and the bacteria present in bovine mastitis is now being undertaken.

Research on the pathogenesis of bovine tuberculosis has been continued, with special reference to pulmonary tuberculosis. The

common portals of entry have been ascertained, and it is now hoped to correlate the portal of entry with the subsequent dissemination of the infective agent. An extensive outbreak of primary udder tuberculosis has been investigated.

Poultry Diseases Section.—The investigation of neoplastic diseases of the domestic fowl was continued and an article on the subject has been published.

PHYSIOLOGY DEPARTMENT.

Research upon the chemical properties of hæmoglobin in horses' blood has been continued, and a method for the volumetric determination of very small quantities of iron in blood and other biological material has been published.

ANATOMY DEPARTMENT.

A critical examination of the normal adrenal gland of the horse has been carried out with a view to making a close study of certain abnormalities of these glands which were noted during 1944 in the course of post-mortem examinations of cases of grass sickness. This work has confirmed the view that the glands then examined showed well-marked deviations from the normal. A paper on the normal adrenal gland of the horse is being published.

The examination of the arterial system of the kidneys of domestic animals was continued and an article on this subject has been published.

DEPARTMENT OF HYGIENE, DIETETICS, AND ANIMAL HUSBANDRY.

A series of investigations has been made into the nutrition of young chickens, with special reference to the problem of Six-Day Chick Disease.

Studies on experimental zinc phosphide poisoning in poultry and on the relationship of nutrition to *Clostridium Welchii* infection have also been carried out.

MILK RECORDS.

FORTY-SECOND YEAR—RECORDS OF 46,972 COWS.

By JAMES A. PATERSON, Secretary-Superintendent,
The Scottish Milk Records Association.

SYSTEMATIC milk recording in Scotland was continued in 1944 under the direction of the Scottish Milk Records Association on the same lines as in previous years.

The Association in 1944 consisted of the following members of Milk Recording Societies :—

Name and Address.	Body Represented.
Mr Jas. Currie, Drumadoon, Blackwaterfoot	Arran.
Mr E. A. Bell, 2 Miller Road, Ayr	Central and South Ayrshire Milk Recording Society (7 Circuits).
Mr John Lockhart, Stair House, Mauchline	
Mr William Wallace, Lyonstone, Maybole	
Mr R. H. U. Stevenson, Corseclays, Ballantrae	
Mr M. Semple, Sandhill, Drongan	
Mr K. N. Russell, Auchincruive, by Ayr	Central Ayrshire No. 2 Milk Recording Society.
Mr D. M'Kerrow, Croftfoot, Sorn	
Mr George Templeton, Carnell Home Farm, Hurford	Central Scotland Milk Recording Society (5 Circuits).
Mr Thomas Pettigrew, Haimyres Hospital, East Kilbride	
Mr R. Lohar, Greenlees, Cambuslang	
Mr T. H. Ballantyne, Woods, Auchenheth	
Mr Thos. Johnstone, Standalane, Falkirk	
Mr M. Bowie, Balmuldy, Maryhill	Dumbartonshire Milk Recording Society
Mr W. M'Lachlan, East Crookedstone, Quarter	
Mr Robert Watt, Milligs Farm, Helensburgh	Dumfriesshire Milk Recording Society (4 Circuits).
Mr M. Sloan, Hunterhouse, Lochmaben	East Lothian and Border Milk Recording Society (2 Circuits).
Mr David S. Clark, Bellshiel, Duns	Fife Milk Recording Society (2 Circuits).
Mr R. Chalmers Watson, Fenton Barns, Midlothian	Highland Milk Recording Society.
Mr G. W. Lambie, Nether Pratts, Leven	Lesmahagow Milk Recording Society.
Mr A. Munro, Dell of Inshes, Inverness	Machars Milk Recording Society (2 Circuits).
Mr T. B. M'Gregor, Lesser Inn, Lanark	North Ayrshire (John Speir) Milk Recording Society (3 Circuits).
Mr John Wallace, Whitehills, Sorbie	North of Scotland Milk Recording Society (4 Circuits).
Mr Jas. Howie, Jun., Eglinton Mains, Irvine	
Mr J. M. Matthew, Girthill, Saltcoats	
Mr Thomas Murdoch, West Tannacrieff, Kilmarnock	
Mr James A. Stephen, Conglass, Inverurie	
Mr A. Spence, Commieston, Montrose	
Mr T. R. Barron, Findownie, Brechin	
Mr R. C. May, 77 Crown Street, Aberdeen	
Capt. Ian S. Robertson, Linkwood, Elgin	

Name and Address.	Body Represented.
Mr Robert Howie, Flatterton, Greenock	Renfrew and Bute Milk Recording Society (2 Circuits)
Mr John Raeside, Hattrick, Kilmalcolm	
Mr John Forster, Mains of Larg, New Luce	Rhins of Galloway Milk Recording Society (4 Circuits).
Mr A. N. McCaig, Challoch, Stranraer	
Mr A. McWilliam, East Balscalloch, Kirkcolum	Stewartry Milk Recording Society (5 Circuits).
Mr J. McIntyre, Logan Mains, Stranraer	
Capt. J. M. Gilmour, Chapelton, Borgeue	
Mr J. G. Baird, Kirkchrist, Kirkcudbright	
Mr George Barbour, Auchengibbert, Crockettford	The Ayrshire Cattle Herd-Book Society of Great Britain and Ireland.
Mr G. Clark, Newmains, Prestonmill	
Col. W. T. R. Houldsworth, Kirkbride, Maybole	
Mr A. W. Montgomerie, Westburn, Cambuslang	
Mr James Howie, Muirside, Dumfries	The Highland and Agricultural Society of Scotland.
Dr A. B. Fowler, Ph.D., B.Sc., Kirkhill, Ayr	
Mr James Kilpatrick, Craigie Mains, Kilmarnock	The British Friesian Cattle Society.
Captain Ian S. Robertson, Linkwood, Elgin	
Mr Jas. Wither, Awhirk, Stranraer	The West of Scotland Agricultural College.
Mr W. J. Kilpatrick, Muirhouse, Kilmarnock	
Mr Thomas Johnstone, Standalane, Falkirk	The Edinburgh and East of Scotland College of Agriculture.
Mr James Dunlop, Midland, Prestwick	
Mr J. S. Stevenson, Balig, Ballantrae	The North of Scotland College of Agriculture.
Mr John Kirkwood, B.Sc., N.D.A., 6 Blythswood Square, Glasgow	
Dr A. M. Smith, 13 George Square, Edinburgh	Animal Diseases Research Association.
Dr A. Cunningham, 13 George Square, Edinburgh	
Dr J. F. Tocher, 41½ Union Street, Aberdeen	The Hannah Dairy Research Institute.
Mr John C. Grant, Veterinary Department, Marischal College, Aberdeen	
Mr Arthur R. Wannop, B.Sc., B.Eng., 41½ Union Street, Aberdeen	Co-opted Members.
Mr John Forster, Mains of Larg, New Luce	
Mr W. Cassels Jack, Glenpark, Braxfield Road, Lanark	
Dr Norman C. Wright, M.A., Ph.D., Kirkhill, Ayr	
Dr A. B. Fowler, Ph.D., B.Sc., Kirkhill, Ayr	
Sir Guy Shaw-Stewart, Ardgowan, Inverkip	
Lord Rowallan, Rowallan, Kilmarnock	
Mr John Speir, 81 Hope Street, Glasgow	
Mr Alan Barr, Holsland, Monkton	
Dr Chalmers Watson, Fenton Barns, Drem	

Chairman—Col. W. T. R. Houldsworth.

The following were the principal members of the staff :

Superintendent-Secretary—Mr James A. Paterson.

Assistant Superintendent—Mr Percy H. Hart.

SCHEME OF OFFICIAL MILK RECORDS.

ADMINISTRATION.

In 1944, as in previous years, the scheme of Official Milk Records was administered by the Association through local milk recording societies. During the latter part of 1943 and the earlier months of 1944 every effort was made to obtain new members for local societies throughout the various dairying districts of Scotland, and a number of new members were enrolled; but for various reasons, such as members disposing of their dairy herds or removing from their farms, &c., there were a certain number of resignations.

All the local societies which operated in 1943 continued in 1944. The number of recorders' circuits in 1944 was 45. The number of herds officially tested was 1024, and the number of cows officially tested 46,972, an increase of 156 herds and 5496 cows from the previous year. The following is a list of the milk recording societies which operated in 1944, with the name and address of the Secretary of each society :—

Name of the Society.	Secretary.
Arran	Mr J. M'Alister, Bellevue, Sliderry.
Central and South Ayrshire (7 Circuits)	Mr E. A. Bell, M.A., B.Sc., 2 Miller Road, Ayr.
Central Ayrshire No. 2 .	Mr George F. F. Smith, Union Bank, Kilmarnock.
Central Scotland (5 Circuits)	Mr Arthur Gilmour, C.A., 23 Silvergrove Street, Glasgow.
Dumbartonshire . . .	Mr Robert Bilsland, 35 Wylie Avenue, Alexandria.
Dumfriesshire (4 Circuits)	Messrs Henderson & Mackay, Solicitors, Lockerbie.
East Lothian and Border (2 Circuits).	Messrs Inglis, Orr, & Bruce, 19A Hill Street, Edinburgh.
Fife (2 Circuits) . . .	Mr F. Dow, Commercial Bank, Thornton, Fife.
Highland	Mr J. M. Hunter, Queensgate, Inverness.
Lesmahagow	Mr Thomas MacKail, British Luen Bank, Lesmahagow.
Machars (2 Circuits) . .	Mr R. M. Dimoline, Moorpark of Barr, Newton Stewart.
North Ayrshire (John Speir) (3 Circuits)	Mr George F. F. Smith, Union Bank, Kilmarnock.
North of Scotland (4 Circuits)	Mr Robert C. May, Advocate, 77 Crown Street, Aberdeen.
Renfrew and Bute (2 Circuits)	Mr Thomas Hunter, Solicitor, 35 High Street, Paisley.
Rhins of Galloway (4 Circuits)	Mr W. Brown Moir, Cairnslea, Stranraer.
Stewartry of Kirkcubright (5 Circuits)	Mr Patrick Gifford, Solicitor Castle Douglas.

SEASON 1944.

The following table shows for each society or circuit the number of herds, the number of cows tested, the average interval between tests, and the duration of the recording season :—

Name of the Society or Circuit.	No. of Herds.	No. of Cows Tested.	Average interval between Tests, in Days	Duration of Recording Season in Weeks.
1. Arran	15	347	25	52
Central and South Ayrshire—				
2. Ayr and Drongan	23	852	27	52
3. Cumnock	24	831	28	52
4. Girvan	23	1185	28	52
5. Kilmarnock	23	959	27	52
6. Maybole	23	918	27	52
7. Ochiltree	22	845	26	52
8. Tarbolton	22	889	26	52
9. Central Ayrshire No. 2	21	899	26	52
Central Scotland—				
10. Dunblane	25	1026	28	52
11. Falkirk	25	769	28	52
12. Hamilton	25	1050	28	52
13. Strathaven	27	1089	30	52
14. Strathendrick	22	1158	28	52
15. Dumbartonshire	26	1032	29	52
Dumfriesshire—				
16. Dumfries—No. 1	22	993	28	52
17. „ No. 2	23	984	28	52
18. „ No. 3	24	1156	28	52
19. „ No. 4	25	1019	28	52
East Lothian and Border—				
20. East Lothian and Border—No 1	21	847	28	52
21. „ No 2	22	936	28	52
Fife—				
22. Fife—No. 1	22	984	26	52
23. „ —No. 2	21	1044	26	52
24. Highland	24	909	28	52
25. Lesmahagow	25	958	28	52
Machars—				
26. Machars—No. 1	24	1367	28	52
27. „ No. 2	25	1167	28	52
North Ayrshire (John Speir)—				
28. Fenwick	19	889	25	52
29. 'John Speir'	22	786	27	52
30. Stewarton and Montgomerie	24	1084	28	52
North of Scotland—				
31. North of Scotland—No. 1	21	1106	28	52
32. „ No. 2	19	1084	28	52
33. „ No. 3	23	1108	28	52
34. „ No. 4	24	1435	29	52
Renfrew and Bute—				
35. Bute and Kintyre	25	841	28	52
36. Paisley	25	960	28	52
Rhins of Galloway—				
37. Kirkcolum	23	1320	28	52
38. Kirkmaiden	16	1177	26	52
39. Luce Valley	21	1308	28	52
40. Stranraer	19	1174	26	52
Stewartry of Kirkcumbright—				
41. Stewartry—No. 1	24	1546	28	52
42. „ No. 2	25	1222	28	52
43. „ No. 3	23	1292	28	52
44. „ No. 4	20	1076	28	52
45. „ No 5	24	1351	28	52
Total No.	1024	46,972	...	...

DEFINITIONS.

The milk records compiled by the Association are records of the estimated quantity of milk produced by each cow in a separate lactation, and of the estimated percentage of milk fat contained in the milk. For convenience, a gallon of milk is reckoned as 10 lb. A gallon of milk of average quality weighs almost exactly 10½ lb. The following further particulars concerning each record were also given wherever possible :—

Name of cow, hyre number, and herd-book number.

Sire of cow and herd-book number of sire.

Dam of cow and herd-book number of dam.

Date of birth.

Date of calving preceding opening of record.

Number of weeks in milk.

Date of calving after record closed.

The following particulars of the preceding records were appended to each record, where available :—

Date of calving preceding opening of record.

Quantity of milk in gallons.

Percentage of fat in milk.

Number of weeks in milk.

The milk yields were estimated in respect of quantity and milk-fat percentage from the results of systematic periodic tests by trained recorders approved by the Association. The recorders visited the farms for this purpose at intervals varying from twenty-one to twenty-eight days, and each day of visit was regarded as the middle day of the period covered by the test. Milk records estimated in this way approximate closely to the actual milk yields.

METHOD OF RECORDING—OFFICIAL RECORDS.

A distinctive feature of milk recording in Scotland in 1944, as in previous years, was that the official records were entirely the work of trained official recorders. Recorders had previously to undergo a special course of training in milk recording at the West of Scotland Agricultural College or other approved College of Agriculture. Only candidates of good character and good general education were selected to attend these courses; and all recorders before appointment were approved by the Executive Committee of the Association.

All dairy farmers taking advantage of the Association's scheme were arranged into Local Milk Recording Societies employing one or more recorders, the Executive Committee having power to transfer members from one local society to another, in order to find accommodation for new applicants, and at the same time avoid overlapping of recorders' circuits. Each local society applying to the Association for licence to conduct milk recording under the Association's scheme signed the form containing the Association's rules and regulations, and agreed to conform to these rules. The local society selected and appointed their recorder or recorders

from the list of approved recorders obtained from the Association. Apparatus, chemicals, sheets, and books were selected and arranged for by the Association, all byre sheets and record books used by the recorders being supplied free of charge. Thus uniformity of method was, as far as possible, assured.

The official recorder visited each herd at regular intervals of not more than twenty-eight days. He, or she, arrived at the farm in the afternoon, usually by means of a small pony and trap provided by the local society for the purpose, or by motor-car, and was accommodated at the farm overnight. All cows giving milk in each herd, as far as possible, were included in the records. Each cow was clearly distinguished in the byre by a stall number on the wall, immediately in front of and above the level of the cow, and registered animals were also indelibly tattooed on the ears with distinctive registered tattoo markings. The cows were milked in the same rotation, evening and morning, on the occasion of the recorder's visit. The recorder weighed and sampled the milk of each cow in the evening, noting the time at which each cow was milked, and entered the results in the corresponding columns in the byre sheet, taking up a position in the byre as near to the milkers as possible, so as to have them in full view, and, as far as practicable, receiving the milk direct from the milker at the cow's side. He or she again weighed and sampled the milk of each cow in a similar manner in the morning, and entered the results in the byre sheet. He or she then tested the mixed evening and morning proportionate sample for each cow by the Gerber method, for percentage of milk fat. He or she entered in the byre sheet any unusual conditions likely to affect the milk yields. The recorder was required to see that all milk samples and byre sheets were securely locked up overnight or during his absence. From the daily results the recorder calculated and completed the byre sheets, multiplying the yields by the exact number of days which had elapsed since the last test, but so calculating throughout that each day of the visit was regarded as the middle day of the period covered by the test. Special ready-reckoners were used to facilitate calculating and to ensure greater accuracy.

The byre sheets were written out in duplicate. The principal copies were posted at regular intervals to the office of the Association, and the second copies left with the respective members. The recorder transferred the results from the extended byre sheets to the milk record book for the herd indelibly in ink, each cow being assigned a separate page at the top of which full particulars of the cow were entered, including the indelible tattoo marks on the animal.

Visits of inspection were made to each recorder and to the members of local societies at the different farms periodically throughout the year by members of the Association's staff, and reports thereon submitted to the Executive Committee. The Executive Committee reserved the right to withdraw approval of any recorder at any time, or to limit the period of service of any recorder with any particular society. Members of local societies refusing to observe any of the rules of the Association, or deemed

to be guilty of conduct injurious to the true interests of milk recording, were liable to be temporarily or permanently suspended.

During the year a number of surprise tests were made by the Association's staff in order to check the recorder's work. Re-tests of the milk samples already tested by the recorder were also carried out; for this purpose recorders were instructed to retain the milk samples each morning till ten o'clock.

All records were closed at the end of December, the current lactations being carried forward to the new books of the following year. Finally, summary sheets were written out in duplicate showing the total milk yield for each cow for the lactation or part lactation, with full particulars of the cow, dates of calving, &c. The principal copy of the summary sheet was posted to the Association's office with the record book, and the second copy left with the owner of the herd.

All record books and summary sheets were carefully revised, corrected in detail, and initialed in the Association's office during the next few months, the record books being returned later to the respective members, and the summary sheets retained and bound for future reference.

The milk records were next classified into three groups for cows and heifers respectively as undernoted. Experience has confirmed the view that the most useful comparison is obtained by reckoning the yields in terms of pure butter fat. Such a comparison takes into consideration both the quantity and the quality of the milk.

Cows with a milk record equivalent to not less than 280 lb. of butter fat, and heifers with a milk record equivalent to not less than 224 lb. of butter fat, were grouped in Class I. Cows and heifers with milk records of less than two-thirds of these amounts—viz., 186 and 149 lb. of butter fat respectively—were grouped in Class III.

The following short table shows the corresponding values of these yields in fairly good milk of 3·5 per cent milk fat :—

Class.	Yield of Butter Fat. (Lb.)	Corresponding Yield in Milk of 3·5 per cent Fat. (Gallons.)
Cows in Class I. .	Not less than 280 .	800
Heifers in Class I. .	Not less than 224 .	640
Cows in Class III. .	Less than 186 .	531
Heifers in Class III. .	Less than 149 .	426

All cows and heifers with milk yields falling between these limits would come into Class II. Such animals naturally claim less attention than the good milkers or the obviously unprofitable animals. It should be noted, however, that Class II. would include a certain number of unclassifiable yields, as there were a number of cases where, from various causes, the results of a whole normal lactation could not be obtained.

It should be noted that while the above standards for classification of milk yields are the same as for 1934 onwards, they are

higher than those formerly adopted, in the proportion of 280 lb. of butter fat for a Class I. cow to the former standard of 250 lb., the other standards bearing the same relation as formerly to the cow Class I. standard. This decision of the Executive Committee brought the Class I. standard for cows and heifers respectively into line with those adopted since 1924 for the Association's Annual Register of High-yielding cows. This subject was dealt with more fully in the 1934 report under "General Review."

It should always be kept in mind when making a comparison of cows in different herds or in different districts that the different methods of dairying practised have a considerable influence on the milk yields, and that therefore milk yields alone do not necessarily indicate the true relative inherent or hereditary milking qualities of the animal, but the authenticated milk records compiled by the Association are of inestimable value to breeders and owners of dairy cows if properly interpreted.

GENERAL REVIEW.

The year 1944 has been an outstanding year in so far as milk recording is concerned. The difficulties in regard to labour, equipment, and the supply of alcohol and acids were even more acute, but notwithstanding this, the Association were able to maintain the control which has been a feature of the Scottish system of milk recording since its inception in 1912, and to increase the number of cows tested to 46,972, being 5496 in excess of the 1943 figure, and the greatest number ever tested under the Association's Scheme.

The demand for milk recording has continued, but it has not as yet been possible to accommodate all the applicants. The Association have, however, been able to arrange for the inauguration of one new Society in Kintyre and for additional circuits in—

Central and South Ayrshire,
Central Scotland,
Rhins of Galloway,
Dumbarton,
Fife,
East Lothian and Border,

bringing the total number of local Milk Recording Societies up to 17, the number of circuits to 51, and the number of members to 1140—an increase of 116 since the beginning of the year.

As in 1943, the recording work has been carried out by women recorders, who, prior to appointment, received a special course of instruction at the West of Scotland Agricultural College, Auchincruive.

The position in regard to recorders has eased a little during recent months, and if the necessary equipment is released by the Ministry of Supply, it will be possible before the end of the year to accommodate all herd owners wishful of having their herd's milk recorded, which will bring the total number of cows under test up to approximately 60,000.

ANALYSES FOR MEMBERS DURING 1944.

By Dr J. F. TOCHER, Aberdeen, Analyst to the Society.

THE following is a short account of the results of analyses of samples sent in by members during 1944 :—

FERTILISERS.

The fertilisers examined during the season included twenty-three compound manures, three samples of muriate of potash, six samples of lime fertilisers, and a sample of superphosphate. The following table (Table I.) gives the results of analyses of the compound fertilisers.

TABLE I.

	Nitrogen.	Soluble phosphoric acid	Insoluble phosphoric acid.	Potash
Semi-concentrated potato	9.12	11.83	3.03	11.42
Special early potato	6.38	8.50	2.73	4.96
Potato manure	8.05	6.11	1.73	7.69
" "	7.27	7.25	1.08	6.40
" "	7.10	5.90	1.51	9.15
" "	3.94	6.19	2.51	12.90
" "	4.07	6.96	1.82	14.12
" "	6.07	8.00	0.51	11.11
Sugar-beet manure	5.64	7.59	3.33	2.32
No. 1 manure	5.75	8.29	0.52	13.02
P.H.L.O. manure	3.90	6.17	3.09	8.47
Special manure	3.58	8.12	3.74	2.97
Floor pickings	4.34	7.43	2.85	5.16
" "	3.35	7.06	3.28	5.26
Turnip manure	4.25	10.56	4.93	..
" "	5.06	24.36	10.08	..
" "	4.30	10.73	7.54	..
" "	3.53	9.77	4.70	..
Gram manure	5.94	11.52	1.41	..
" "	3.90	8.05	2.90	..
" "	4.31	12.12	0.89	..
Manure	6.41	8.81	3.02	..
"	3.81	15.34	9.25	..

The potato manures contained from 3.9 to 8.0 per cent of nitrogen, from 5.9 to 8.5 per cent of soluble phosphoric acid, from 0.5 to 2.7 per cent of insoluble phosphoric acid, and from 4.9 to 14.1 per cent of potash. The average for the seven samples marked

"potato manure" was 6.12 per cent nitrogen, 6.98 per cent soluble phosphoric acid, 1.69 per cent insoluble phosphoric acid, and 9.47 per cent potash. A sample marked "semi-concentrated potato manure" contained 9.12 per cent nitrogen, 11.83 per cent soluble phosphoric acid, 3.03 per cent insoluble phosphoric acid, and 11.42 per cent potash.

One of the samples of turnip manure analysed was of unusual composition, containing 5.06 per cent nitrogen, 24.36 per cent soluble phosphoric acid, and 10.08 per cent insoluble phosphoric acid.

The samples of muriate of potash had a potash content of from 59.7 to 62.6 per cent.

A sample of ground limestone was found to contain only 73.4 per cent of calcium carbonate, with 21.7 per cent of silica and silicate. Another limestone was found to be of much better quality, containing 96.4 per cent of calcium carbonate. Two samples of waste lime contained 47.9 and 57.5 per cent of calcium carbonate. The corresponding moisture contents were 36.7 and 32.5 per cent. The proportions of caustic lime in two samples of burnt limestone were 50.3 and 81.1 per cent.

Compound fertilisers for the turnip crop, as well as those for the potato and sugar-beet crops, will contain potash next season. A potash fertiliser will also be available, through the Agricultural Executive Committees, for soils deficient in potash.

FEEDING-STUFFS.

The feeding-stuffs analysed during the year included the usual compound cakes and meals for cattle, pigs and poultry, and samples of hay, silage, flax chaff, and bone and meat meals.

Most of the compound cakes and meals analysed were found to be in accordance with the requirements of the Ministry of Food. A chick mash, however, was found to contain only 14.5 per cent of albuminoids, which is below the minimum of 17 per cent prescribed.

A sample of "feeding-stuff" was found to contain only 5 per cent of albuminoids, with 2.5 per cent of oil, and 23.8 per cent of fibre. This material, on account of the high proportion of fibre present, was reported as being suitable for feeding to stock in only a small proportion of a ration.

A sample of hay was found to be of very poor quality, containing only 1 per cent of oil and 4.3 per cent of albuminoids. Medium quality hay contains, on the average, about $2\frac{1}{2}$ per cent of oil and 9.6 per cent of albuminoids. A silage, received for comparison with the hay, was found to be of much better food value. When the results were calculated to the same moisture content as the hay the proportions of oil and albuminoids present were 2.4 and 8.6 per cent respectively. There was a difference of only about 3 per cent in the carbohydrate content of the two feeding-stuffs. Another sample of silage was of satisfactory quality, although it

contained 3 per cent of mineral matter, including 1.6 per cent of sand.

Two samples of flax chaff analysed were quite different in composition. One sample contained 3.3 per cent of oil, 7.5 per cent of albuminoids, and 33.3 per cent of fibre, while the other contained 7.8 per cent of oil, 13 per cent of albuminoids, and only 23.2 per cent of fibre.

A sample of linseed screenings was found to contain 12.1 per cent of oil, 13 per cent of albuminoids, and 7.8 per cent of fibre. The amount of mineral matter was excessive, 34.7 per cent being present, including 28 per cent of sand. A further sample, examined after the material had been treated, still contained nearly 19 per cent of sand.

A sample of cocoa husks contained 13.7 per cent of oil, 15.8 per cent of albuminoids, and 13.2 per cent of fibre. The alkaloid theobromine was present to the extent of 0.38 per cent. The average proportion of theobromine in roasted cocoa shells, according to a well-known authority, is 0.5 per cent.

The samples of meat and bone meal examined contained from 6.5 to 9 per cent of oil, from 45.2 to 47.6 per cent of albuminoids, and from 10.6 to 12.2 per cent of phosphoric acid. The average for the samples analysed was 7.74 per cent oil, 46.81 per cent albuminoids, and 11.59 per cent phosphoric acid.

The following table (Table II.) gives the results of analyses of the various feeding-stuffs analysed :—

TABLE II.

	Oil.	Albu- minoids.	Phos. acid.			
Meat and bone meal	9.00	45.19	11.96			
" " " " "	7.70	47.62	12.18			
" " " " "	6.52	47.63	10.63			
				Soluble carbo- hydrates.	Fibre.	Ash. Moisture.
Cocoa husks	13.68	15.81	44.53	13.25	5.25	7.48
Poultry mash	3.42	22.62	..	7.54	..	..
Poultry meal	2.30	18.31	..	9.43	..	..
" " " " "	4.47	19.60	..	8.08	..	..
Chick mash	4.32	14.53	54.07	6.71	9.18	11.19
" " " " "	3.84	17.47	..	6.52	..	..
Feeding meal	3.05	21.25	..	7.20	..	..
Feeding-stuff	2.52	5.00	..	23.81	..	..
Oat feeding meal	1.64	3.69	..	32.00	..	..
Pig meal	3.51	17.88	..	7.45	..	..
Cattle food	4.76	18.19	..	10.65	..	..
Hay	1.00	4.37	46.14	31.13	4.31	13.05
Silage	0.66	2.39	11.98	7.24	1.99	75.74
" " " " "	0.89	2.72	13.17	9.36	3.01	70.85
					Total Mineral matter.	Silica.
Flax chaff	3.27	7.47	..	33.27	8.00	2.60
" " " " "	7.75	13.00	..	23.20	7.95	1.95
Linseed screenings	12.12	13.00	..	7.77	34.75	28.20
" " " " "	14.72	15.19	..	8.57	25.52	18.86

MILKS.

The average proportion of milk-fat in the twenty-three samples of milk analysed was very satisfactory, being 4.3 per cent. The lowest proportion of milk-fat found was 3.45 per cent and the highest 7.13 per cent. The sample containing 7.13 per cent was, however, abnormal and probably not representative of the bulk. Sixteen of the samples analysed contained proportions of fat from 4 per cent upwards.

The following table (Table III.) gives the results of analyses of the samples :—

TABLE III.

No.	Fat per cent.	No	Fat per cent.
1	3.77	13	4.40
2	3.95	14	3.95
3	4.23	15	4.08
4	4.10	16	3.70
5	4.38	17	4.47
6	3.95	18	3.45
7	4.10	19	3.90
8	4.00	20	4.15
9	5.28	21	4.80
10	4.30	22	4.70
11	4.25	23	4.30
12	7.13		

WATERS.

Sixteen of the thirty samples of water examined for potability were of satisfactory quality. One sample, taken from a newly dug well, was of doubtful quality probably owing to disturbance by the work. It is advisable to allow new wells to settle for a few days before drawing a sample for analysis. A sample which was soft and slightly acid in reaction contained an abnormal amount of copper in solution, fifteen parts per million being present. In this case, and in other cases, advice was given as to piping suitable for the supply. One of the samples contained a trace of iron and sufficient dissolved zinc to render the water turbid on heating. Both lead and galvanised iron piping are not infrequently used for supplies for which they are not adapted.

POISONS.

Positive results for poison were obtained in six examinations of stomach contents. Strychnine was found to be the cause of death in two cases of poisoning of dogs, while the alkaloid was also found in portions of a hare used as a bait. In such cases of poison-

ing it will be found that the dogs have invariably got access to poisoned baits, usually rabbit, laid down for the destruction of vermin. The purchase of strychnine is permitted under licence for this purpose. Lead was found to be present in abundance in the contents of the abomasum of two heifers. Lead was also found to be present in samples of waterproof material and jointing paste found in a field where the animals had been grazing. The member was advised to remove all the material out of access of animals. The cause of death of a Rhode Island cock was found to be very acute phosphorus poisoning.

A sample of a proprietary feeding-stuff, containing crushed oats and beans, was examined for the presence of cyanogenetic glucoside, with negative results. For this purpose the beans were removed from the feed and analysed separately. A poultry meal was examined for injurious substances because the birds were reported to have gone off their feed. Nothing of an unusual nature was found and the proportion of salt present was only 0.4 per cent. It is not uncommon for birds to refuse a new food when first presented to them. When using wet mash, care should be taken to avoid staleness or souring by not making up too much feed at one time.

SCOTTISH RED CROSS AGRICULTURE FUND.

FIFTH ANNUAL REPORT.

REPORT ON ACTIVITIES OF THE COMMITTEE OF THE FUND
DURING THE YEAR 17TH APRIL 1944 TO 16TH APRIL 1945,
SUBMITTED TO, AND ADOPTED BY, THE GENERAL COMMITTEE
AT A MEETING HELD ON 20TH JULY 1945.

THE Committee of the Fund completed its fifth year of operations on 16th April. The total amount of contributions received during the year was £213,296, 6s. 1d. To this was added a sum of £124, 13s. 6d., being interest accruing on sums placed on Deposit Receipt for short periods. This gave a total for the year of £213,420, 19s. 7d.

Adding this amount to the sums raised in the preceding four years—£115,876, 14s. 2d. in 1940-41, £109,839, 6s. 10d. in 1941-42, £151,949, 3s. 7d. in 1942-43, and £171,438, 16s. 4d. in 1943-44—gave a grand total for the five years of £762,525, 0s. 6d.

As in the preceding years, the money raised during the fifth year was handed over, at various times throughout the year, to the Scottish Branch, British Red Cross Society, and the St Andrew's Ambulance Association. The sum allocated to the former body was £203,811, 10s. 8d., and to the latter £9609, 8s. 11d.—in all, £213,420, 19s. 7d. The allocation, which was made by the Allocation Committee, was at the rate of 95 per cent to the Red Cross and 5 per cent to the St Andrew's Association. A sum of £21,232, 1s. was, however, excluded from the general allocation on account of the fact that it comprised sums specially earmarked by the donors for the Red Cross Society or for parcels for Prisoners-of-War. This sum was allocated entirely to the Red Cross Society to be devoted to the purposes specified.

The total allocation to the Scottish Branch, British Red Cross Society, during the past five years was £702,216, 9s. 9d., and to the St Andrew's Ambulance Association £60,308, 10s. 9d.

The expenses incurred in connection with the Fund during its fifth year amounted to a sum of £184, 19s. 2d., being mainly for printing, stationery, and postages. These expenses were again defrayed by the Highland and Agricultural Society, which also provided the staff, office accommodation, telephone service, &c., free of charge. The Committee was, therefore, once more able to hand over every penny it received, plus Deposit Receipt interest, to the benefiting charities, without any deduction whatever for expenses.

AREA COMMITTEES.

To the Area Committees again must be given the credit for providing the greater portion of the year's income. Practically

nine-tenths of the total revenue was secured through the efforts of these Committees. After five years of war it would not have been surprising if there had been a falling-off in enthusiasm, but in very few instances was this evident. In the great majority of cases these Committees set to work with a quiet determination to surpass their previous years' figures, and in practically all cases they were successful. As will be mentioned later in this report, some Area Committees succeeded in raising astonishing amounts.

All methods of raising money were adopted, including voluntary levies and collections, free gift sales, prize-drawings, dances, whist-drives, &c. It appears to have been by a combination of these efforts that the larger sums were raised. The organisation in many areas was most complete, with working Committees and collectors in every parish. Women's Committees have taken an increasing part in all these activities, and frequently Committees reported that the success of their effort was largely due to the whole-hearted support of the ladies. The Women's Rural Institutes, the Women's Land Army, and Young Farmers' Clubs have again given most valuable assistance. As reported last year, the urban populations of many towns, especially those with agricultural connections, have co-operated enthusiastically with the Area Committees and have contributed most handsomely to the funds.

The subjoined list of Committees is arranged, as in previous Reports, under Highland Show Divisions. The amounts raised in each case during the year under review and in the four preceding years are given, and also the total for the five years.

ABERDEEN SHOW DIVISION.

<i>Aberdeenshire—</i>	1940-41, 1941-42, 1942-43, 1943-44, and 1944-45	Total.
Aberdeen	£2,647 6 3 2,159 14 8 3,120 3 6 5,000 0 0 4,170 0 0	
Alford	£788 19 2 805 6 11 .. 510 12 6 1,038 13 9	£17,097 4 5
Bromar and Upper Deeside	£332 14 3 148 4 0 223 6 6 254 0 0	3,143 12 4
		958 4 9
Carry forward		£21,199 1 6

				Total.	
Brought forward . . .				£21,199	1 6
Ellon Area	(1940-41)	£1831	3 11		
1941-42, 1942-43, 1943-44, and 1944-45.					
Ellon		£847	9 6		
		1,020	2 7		
		1,198	10 4		
		1,501	10 2		
		£4,567	12 7		
Foveran		£608	15 1		
		1,360	14 4		
		1,472	15 2		
		1,800	0 0		
		£5,242	4 7		
Hatton		£1,025	3 1		
		1,051	5 0		
		1,298	10 0		
		1,451	0 0		
		£4,825	18 1		
Tarves		£1,500	0 0		
		2,006	0 0		
		3,010	0 0		
		5,000	0 0		
		£11,516	0 0		
Udny		£1,267	11 6		
		1,290	17 9		
		1,560	8 0		
		1,950	0 0		
		£6,068	17 3	34,051	16 5
1940-41, 1941-42, 1942-43, 1943-44, and 1944-45.					
Insch		£1,435	8 4		
		1,264	10 1		
		935	0 0		
		2,600	0 0		
		3,000	0 0		
		£2,000	0 0	9,234	18 5
Inverurie		£2,150	0 0		
		1,470	0 0		
		3,150	0 0		
		2,000	0 0		
		£1,506	10 0	10,770	0 0
Maud		2,500	0 0		
		187	12 6		
		16	10 10		
		2,791	0 0		
		7,001	13 4		
Carry forward		£82,257	9 8		

		Total
Brought forward . . .		£82,257 9 8
	<i>1940-41, 1941-42, 1942-43, 1943-44, and 1944-45.</i>	
Methlick	£500 0 0 550 0 0 1,550 0 0 2,250 0 0	4,850 0 0
Monymusk and Cluny	£1,000 0 0 1,085 14 0	2,085 14 0
Oldmeldrum	£258 0 0 350 0 0	608 0 0
Strathbogie (Huntly)	£1,241 0 0 1,744 2 2 1,782 16 6 2,230 0 0 2,685 0 0	9,682 18 8
Torphins	£338 12 1 744 13 5	1,083 5 6
Turriff	£1,400 0 0 2,031 19 10 1,870 19 6 4,676 6 6 6,377 2 4	16,356 8 2
<i>Banffshire—</i>		
Banff and Cornhill (Lower Banffshire)	£5,020 0 0 5,553 0 0 9,620 0 0 13,357 1 2 13,522 10 3	47,072 11 5
Dufftown	£548 5 8 39 7 5	587 13 1
Carry forward . . .		£164,584 0 6

		Total.
Brought forward . . .	£164,584	0 6
	1940-41, 1941-42, 1942-43, 1943-44, and 1944-45.	
Keith	£839 11 5 625 18 0 560 0 0 490 0 0 800 0 0	
		3,315 9 5
<i>Kincardineshire—</i>		
Banchory	£522 18 0 200 0 0 657 11 6 .. 676 12 10	
		2,057 2 4
South Kincardineshire (Laurencokirk)	£2,046 0 0 2,419 11 6 2,063 5 2 4,002 19 3 3,632 2 5	
		14,163 18 4
Stonehaven	£866 4 2 1,064 4 6 1,381 12 9 2,238 7 3 2,615 7 11	
		8,165 16 7
		<u>£192,286 7 2</u>

BORDER SHOW DIVISION.

<i>Berwickshire—</i>		
Duns	£3,661 18 1 .. 4,288 11 6 3,237 5 9 2,528 16 3	
		£13,716 14 7
<i>Berwickshire and Roxburghshire—</i>		
St Boswells	£2,600 0 0 2,400 0 0 1,500 0 0 2,100 0 0 3,400 0 0	
		12,000 0 0
<i>Peeblesshire—</i>		
Peebles	£1,355 3 9 2,765 12 0 1,496 19 0 740 0 0 3,931 12 1	
		10,289 6 10
Carry forward . . .		<u>£36,006 1 5</u>

		Total
	Brought forward . .	£36,006 1 5
<i>Roxburghshire—</i>	<i>1940-41, 1941-42, 1942-43, 1943-44, and 1944-45.</i>	
Hawick.	£200 0 0 289 0 0 250 0 0 310 0 0	
		1,049 0 0
Kelso and Jedforest	£3,274 17 9 2,822 12 3 3,162 19 7 2,951 8 4 2,373 13 7	
		14,585 11 6
Newcastleton.	£182 16 2 177 15 0 233 7 0 331 0 0 412 0 0	
		1,336 18 2
<i>Selkirkshire—</i>		
Selkirk	£555 7 0 587 6 5 344 0 0 340 0 0 1,006 0 0	
		2,832 13 5
		<u>£55,810 4 6</u>

DUMFRIES SHOW DIVISION.

<i>Dumfriesshire—</i>		
Annan	£590 6 2 753 8 0 1,676 2 9 2,720 16 6 750 0 0	
		£6,490 13 5
Dumfries	£650 0 0 600 0 0 700 0 0 3,069 1 0 1,850 0 0	
		6,869 1 0
Langholm	£219 0 0	
	670 0 0	
		889 0 0
Carry forward . .		£14,248 14 5

		Total.	
	Brought forward . . .	£14,248 14 5	5
	1940-41, 1941-42, 1942-43, 1943-44, and 1944-45.		
Lockerbie	£773 15 9		
	..		
	2,381 3 0		
	2,336 10 0		
	1,236 16 0		

		6,728 4 9	
Thornhill (Upper Nithsdale) . . .	£971 7 5		
	1,117 19 11		
	2,000 0 0		
	2,700 17 2		
	3,000 0 0		

		9,790 4 6	
<i>Kirkcudbrightshire—</i>			
Castle Douglas	£4,000 5 3		
	..		
	13,000 3 0		
	..		
	20,224 3 6		

		37,224 11 9	

		£67,991 15 5	

EDINBURGH SHOW DIVISION.

East Lothian—

Haddington	£3,109 5 2		
	2,780 10 8		
	2,723 1 1		
	2,328 18 11		
	1,738 9 3		

		£12,680 5 1	

Midlothian—

Dalkeith	£2,100 10 10		
	2,449 0 5		
	1,863 11 10		
	2,910 19 4		
	3,186 14 1		

		12,510 16 6	
Edinburgh	£1,692 7 0		

		1,692 7 0	
Western Midlothian . . . . .	..	
	..		
	£523 0 0		
	226 17 0		
	1,570 10 0		

		2,320 7 0	
Carry forward . . .		£29,203 15 7	

		Total
Brought forward . . .		£29,203 15 7
<i>West Lothian—</i>	<i>1940-41, 1941-42, 1942-43, 1943-44, and 1944-45.</i>	
Bathgate	(1941-42)	1,970 11 2
Linlithgow	£1,709 8 8	
	1,704 12 2	
	1,029 0 0	
	4,000 17 6	
	3,586 0 3	
	<hr/>	12,029 18 7
		<hr/> £43,204 5 4

GLASGOW SHOW DIVISION.

<i>Argyll—</i>		
Kilfinan and Tighnabruaich	£114 10 0	
	202 10 0	
	154 10 8	
	163 0 0	
	<hr/>	£634 10 8
Mid-Argyll	£150 0 0	
	300 0 0	
	270 0 0	
	<hr/>	720 0 0
<i>Ayrshire—</i>		
Ayr (South Ayrshire)	£4,000 0 0	
	25 0 0	
	3,600 0 0	
	<hr/>	7,625 0 0
Kilmarnock (North Ayrshire)	(1940-41)	550 0 0
<i>Buteshire—</i>		
Arran	(1944-45)	795 0 0
<i>Lanarkshire—</i>		
Biggar	£2,017 10 0	
	1,570 6 8	
	2,907 5 3	
	<hr/>	6,495 1 11
Lanark	£4,009 13 9	
	3,636 1 8	
	6 19 6	
	21 0 0	
	<hr/>	7,673 14 11
Strathaven	(1940-41)	750 0 0
Carry forward		<hr/> £25,243 7 6

		Total.
Brought forward . . .		£25,243 7 6
	1940-41, 1941-42, 1942-43, 1943-44, and 1944-45.	
Wishaw	£1,357 19 0	
	..	
	1,034 6 0	
	..	
	..	
	<hr/>	2,392 5 0
<i>Renfrewshire</i> —		
Paisley	(1942-43)	2,000 0 0
		£29,635 12 6

INVERNESS SHOW DIVISION.

<i>Inverness-shire</i> —		
Inverness	£590 5 6	
	1,903 11 4	
	1,511 8 8	
	1,446 11 11	
	1,039 14 9	
	<hr/>	£6,491 12 2
<i>Moray</i> —		
Elgin, Forres, Knockando, and Elchies . . . . .	..
	£3,505 9 8	
	3,475 4 9	
	1,945 13 8	
	3,398 6 1	
	<hr/>	12,324 14 2
<i>Nairnshire</i> —		
Nairn . . . . .	..
	..	
	£1,130 0 0	
	1,300 0 0	
	60 13 4	
	<hr/>	2,490 13 4
<i>Ross-shire</i> —		
Dingwall	£3,968 14 6	
	..	
	10,613 1 9	
	..	
	17,967 7 4	
		32,549 3
Tain	£1,211 17 6	
	..	
	4,886 18 8	
	<hr/>	6,098 16 2
Carry forward . . .		£59,954 19 5

		Total.
	Brought forward . .	£59,954 19 5
<i>Sutherland—</i>	<i>1940-41, 1941-42, 1942-43, 1943-44, and 1944-45.</i>	
Dornoch	£1,110 0 0	
	1,060 0 0	
	1,166 6 11	
	1,251 2 1	
	1,223 0 0	
	<hr/>	
		5,810 9 0
		<hr/>
		£65,765 8 5

PERTH SHOW DIVISION.

<i>Fife—</i>			
Anstruther	£1,465 0 0		
	1,627 2 0		
	1,630 0 0		
	3,500 0 0		
	3,000 0 0		
	<hr/>		
		£11,222 2 0	
Cupar	£2,007 7 11		
	2,678 8 3		
	2,642 13 2		
	3,000 0 0		
	1,920 0 0		
	<hr/>		
		12,248 9 4	
Dunfermline	£1,770 14 8		
	2,056 8 7		
	1,077 0 0		
	2,686 6 8		
	2,543 10 8		
	<hr/>		
		10,134 0 7	
Thornton	£2,000 0 0		
	2,300 0 0		
	2,100 0 0		
	2,100 0 0		
	1,500 0 0		
	<hr/>		
		10,000 0 0	
<i>Kinross-shire—</i>			
	£1,270 0 4		
	1,550 0 0		
	1,220 0 0		
	1,500 9 6		
	2,950 4 11		
	<hr/>		
		8,490 14 9	
<i>Perthshire—</i>			
Aberfeldy	£1,606 3 7		
	2,597 13 2		
	4,474 7 6		
	<hr/>		
		8,678 4 3	
		<hr/>	
Carry forward . . .		£60,773 10 11	

		Total.
Brought forward . . .		£60,773 10 11
	1940-41, 1941-42, 1942-43, 1943-44, and 1944-45.	
Blairgowrie	£2,127 10 4	
	3,402 0 0	
	4,015 12 5	
	7,000 0 0	
	4,150 0 0	
	<hr/>	20,695 2 9
Perth	£4,801 3 8	
	5,278 19 11	
	6,467 8 9	
	3,090 0 0	
	10,606 8 7	
	<hr/>	36,244 0 11
Pitlochry	£620 0 0	
	696 16 4	
	385 13 10	
	431 16 10	
	263 15 8	
	<hr/>	2,398 2 8
		£120,110 17 3

STIRLING SHOW DIVISION.

Perthshire—

Crieff, &c. (Strathearn)	£2,031 11 10	
	2,014 8 9	
	1,647 2 5	
	190 13 0	
	217 9 6	
	<hr/>	£6,101 5 6

Stirlingshire—

Drymen	(1940-41)	371 10 0
Falkirk	£2,373 11 4	
	2,129 18 0	
	1,034 18 3	
	2,162 9 11	
	1,729 18 3	
	<hr/>	9,430 15 9
Stirling	£5,013 0 0	
	4,610 0 0	
	3,200 0 0	
	3,750 0 0	

16,573 0 0

£32,476 11 3

COUNTY OF ANGUS.

		1940-41, 1941-12, 1942-43, 1943-44, and 1944-45.			
Arbroath	.	.	.	£2,309	7 0
				2,763	7 3
				2,529	2 1
				1,822	19 7
				3,230	10 8
					£12,655 6 7
Brechin	.	.	.	£1,600	0 0
				3,437	3 5
				3,446	15 1
				3,730	19 11
				4,200	3 5
					16,415 1 10
Dundee	.	.	.	£2,003	3 0
				2,488	2 0
				2,031	0 0
				970	0 0
				2,597	12 6
					10,089 17 6
Forfar	.	.	.	£3,500	0 0
				3,951	0 0
				3,670	0 0
				3,955	0 0
				3,050	0 0
					18,126 0 0
Montrose	.	.	.	£2,319	18 4
				3,026	6 9
				2,284	10 0
				5,035	8 8
				5,495	13 2
					18,161 16 11
					<u>£75,448 2 10</u>

ABSTRACT.

Division.	1940-41.		1941-42.		1942-43.		1943-44.		1944-45.		Total.	
	£.	s. d.	£.	s. d.	£.	s. d.	£.	s. d.	£.	s. d.	£.	s. d.
Aberdeen	23,364	13 3	29,267	6 10	31,334	5 1	50,060	5 11	58,259	13 1	192,286	7 2
Border	11,830	2 9	9,042	5 8	11,276	0 1	9,699	14 1	13,062	1 11	55,810	4 6
Dumfries	7,204	14 7	2,471	7 11	19,757	5 9	10,827	4 8	27,730	19 6	67,991	15 5
Edinburgh	8,611	11 8	8,904	14 3	6,138	12 11	9,467	12 9	10,061	13 7	43,204	5 4
Glasgow	12,655	2 9	3,775	11 8	5,564	2 2	454	10 8	4,156	5 3	29,635	12 6
Inverness	6,580	17 6	6,469	1 0	22,753	0 9	5,943	7 5	23,689	1 6	65,765	8 5
Perth	17,668	0 6	19,539	15 1	22,136	1 4	29,308	13 0	31,408	7 4	120,110	17 3
Stirling	9,789	13 2	8,754	6 9	5,882	0 8	6,103	2 11	1,947	7 9	32,476	11 3
County of Angus	11,732	8 4	15,665	19 5	13,961	7 2	15,514	8 2	18,573	19 9	75,448	2 10
Totals	109,767	4 6	108,940	8 9	141,832	18 11	137,379	2 10	159,509	9 8	682,729	4 8

From the foregoing figures it will be seen that the Area Committees have contributed, during the fifth year of operations, a sum of no less than £189,809, 9s. 8d. out of the final total of £213,420, 19s. 7d.

This impressive figure was not raised without careful planning, efficient organisation, and much hard work on the part of the members of Area Committees and their Executives and officials. A perusal of the subscription lists and catalogues prepared by various Committees gives an indication of the enormous amount of trouble taken to see that no source of revenue within the area was overlooked. This entailed in many cases the appointment of Sub-Committees and Collectors in every parish or district. In this way every prospective contributor was directly approached, and accordingly the Fund benefited from the effectiveness of the personal appeal. The work entailed in operating this complete organisation was enormous, and it is difficult to express adequately the General Committee's admiration and thanks for the magnificent service performed by these Area Committees and all associated with them in their splendid efforts.

In singling out certain areas for special mention, the Committee realise that equally good work has been done in areas where smaller sums were raised. The amount of these contributions has no doubt been determined by the size of the area and the local conditions. The sums raised, both large and small, bear eloquent testimony to the devotion and enthusiasm of the organisers as well as to the whole-hearted generosity of the farmers and rural community of Scotland.

In respect of contributions for the fifth year the Stewartry Committee at Castle Douglas takes first place, with a total of £20,224. This marvellous figure constitutes a record for any single area in Scotland. Its attainment was the result of perfect organisation and enthusiastic effort on the part of the office-bearers and members of that Committee.

Mid and Wester Ross, and the Black Isle Area Committee, with its centre at Dingwall, comes next, with an outstanding figure of £17,967. Here again the result was due to the splendid constructive work of the Committee and its executive officials, whose enthusiasm for the cause is worthy of the highest praise. It may be mentioned here that these two areas, Castle Douglas and Dingwall, also occupied first and second place respectively two years ago.

Lower Banffshire Area Committee, which on previous occasions has held the lead for individual contributions, this year occupies third place, with a splendid total of £13,523. It, however, occupies the proud position of having contributed the largest aggregate sum by any area, the total of its contributions in the past five years amounting to the remarkable figure of £47,073. This is a record of performance of which all concerned may well be proud.

Once again the Ellon Area Committee—with a return of £11,702—has provided the Fund with a most worthy donation. With sub-committees centred on Ellon, Foveran, Hatton, Tarves, and Udny, the current donation represents an increase of £3162 over the previous one. Special mention must be made of the highly substantial contribution of £5000 sent in by the Tarves centre. These diligent Committees operating in the Ellon Area have spared no effort to make their combined contribution an outstanding one.

The Perth Local Committee, eminently successful as ever, sent in its latest and most substantial contribution—on this occasion £10,606. The vigorous prosecution by the executives of all its enterprises on behalf of the Fund has been pronounced.

A heavily increased and important donation of £6377 was returned by the active and successful Committee based on Turriff. Farther south, the enterprising Montrose Committee also exceeded its previous record and sent in a splendid contribution of £5496.

At the Aberfeldy centre there was raised the distinctive total of £4474, while strong and sustained support came from the Brechin and District Committee, with a contribution of £4200; from the Aberdeen Area Committee, £4170; and from the East Perthshire Farmers and Burghs Committee (Blairgowrie Centre), £4150.

Other tried and trusted Committees which have continued to accord most substantial support included: Peebles, £3931; South Kincardineshire (Laurencekirk Centre), £3632; West Lothian Agricultural Society (Linlithgow Centre), £3586; St Boswells, £3400; Elgin, Forres, and Knockando and Elchies Committees, £3398; Arbroath, £3231; Dalkeith, £3187; Forfar, £3050; Anstruther, £3000; Inch, £3000; and Upper Nithsdale (Thornhill Centre), £3000.

The undernoted list shows the aggregate of total contributions reached by the Committees named, over the past five years, and is an indication of the tremendous energy imparted to their efforts:—

Lower Banffshire Area Committee	£47,073
Stewartry (Castle Douglas) Committee	37,225
Perth Local Committee	36,244
Ellon Area Committee	34,052
Dingwall Centre Committee	32,549
Blairgowrie Centre Committee	20,695
Montrose Area Committee	18,162
Forfar Area Committee	18,126
Aberdeen Area Committee	17,097
Stirling Centre Committee	16,573
Brechin and District Committee	16,415
Turriff Area Committee	16,356

[TABLE.]

The following list shows the amounts raised by the Area Committees, arranged according to counties :—

County.	1st Year, 1940-41.		2nd Year, 1941-42.		3rd Year, 1942-43.		4th Year, 1943-44.		5th Year, 1944-45.		Total.	
	£	s. d.	£	s. d.	£	s. d.	£	s. d.	£	s. d.	£	s. d.
Aberdeen . .	13,521	14 0	19,404	12 10	17,051	15 8	29,932	13 10	37,012	19 8	116,923	16 0
Angus . .	11,732	8 4	15,665	19 5	13,981	7 2	15,514	8 2	18,573	19 9	75,448	2 10
Argyll . .	..	..	114	10 0	352	10 0	454	10 8	433	0 0	1,354	10 8
Ayr . .	4,550	0 0	25	0 0	3,600	0 0	..	..	..	..	8,175	0 0
Banff . .	6,407	17 1	6,178	18 0	10,180	0 0	13,886	8 7	14,322	10 8	50,975	13 11
Berwick . .	4,911	18 1	1,200	0 0	5,038	14 6	4,287	5 9	4,228	16 8	19,666	14 7
Bute . .	..	..	..	..	..	..	..	..	795	0 0	795	0 0
Clackmannan .	1,000	0 0	461	0 0	235	0 0	840	0 0	..	..	2,536	0 0
Dumfries . .	3,204	0 4	2,471	7 11	6,757	5 9	10,827	4 8	7,506	16 0	30,767	3 8
East Lothian .	3,109	5 3	2,780	10 8	2,723	1 1	2,328	13 11	1,738	9 3	12,680	5 1
Fife . .	7,243	2 7	8,661	18 10	7,449	13 2	11,286	6 8	5,963	10 8	43,604	11 11
Inverness . .	590	5 6	1,903	11 4	1,511	8 8	1,446	11 11	1,089	14 9	6,491	12 2
Kincardine . .	3,435	2 2	3,683	16 0	4,102	9 5	6,241	6 6	6,924	3 2	24,366	17 3
Kinross . .	1,270	0 4	1,550	0 0	1,220	0 0	1,500	9 6	2,950	4 11	8,490	14 9
Kirkcudbright .	4,000	5 3	..	..	13,000	3 0	..	..	20,224	3 6	37,224	11 9
Lanark . .	7,529	17 9	3,636	1 8	2,611	12 2	..	..	2,928	5 3	16,705	16 10
Midlothian . .	3,792	17 10	2,449	0 5	2,386	11 10	3,137	16 4	4,757	4 1	16,523	10 6
Moray . .	..	..	3,503	9 8	3,475	4 9	1,945	13 8	3,398	6 1	12,324	14 2
Nairn . .	..	..	..	..	1,180	0 0	1,300	0 0	60	13 4	2,490	13 4
Peebles . .	1,960	8 9	2,765	12 0	1,496	19 0	740	0 0	3,931	12 1	10,894	11 10
Perth . .	12,686	9 5	13,236	5 0	16,303	10 7	17,857	9 10	19,712	1 3	79,795	16 1
Renfrew . .	..	..	..	..	2,000	0 0	..	..	..	..	2,000	0 0
Ross and Cromarty . .	5,180	12 0	..	..	15,500	0 5	..	..	17,967	7 4	38,647	19 9
Roxburgh . .	4,907	13 11	4,489	7 3	4,396	6 7	4,332	8 4	4,795	13 7	22,921	9 8
Selkirk . .	655	7 0	587	6 5	344	0 0	340	0 0	1,006	0 0	2,932	13 5
Stirling . .	5,253	1 4	4,434	18 0	2,809	13 3	3,927	9 11	1,729	18 3	18,160	5 9
Sutherland . .	1,110	0 0	1,060	0 0	1,166	6 11	1,251	2 1	1,223	0 0	5,510	9 0
West Lothian .	1,709	8 8	3,675	3 4	1,029	0 0	4,000	17 6	3,586	0 3	14,000	9 9
	109,767	4 6	103,940	8 9	141,532	13 11	137,379	2 10	190,809	9 8		
Grand total raised by the Area Committees during the five years											682,729	4 8

In the foregoing list the sums contributed by the Area Committees have been allocated to their respective counties. It should be noted that these figures relate only to sums received from the Area Committees, and that they do not include other contributions sent in from these counties, such as the proceeds of Victory Garden Shows, Dances, &c. It may also be mentioned that an Area Committee may have operated from a centre so near the boundary that its area of activity inevitably extended into a neighbouring county. While the figures given, therefore, represent the allocation to the respective counties of sums received from centres operating in these counties, the figures may not be taken as a complete and exhaustive record of the total effort of any county on behalf of the Fund.

It will be seen from the foregoing list that, during the fifth year, the County of Aberdeen retained its leading position with a total contribution of £37,013, succeeded by Kirkcudbrightshire with £20,224. Perthshire returned £19,712; Angus, £18,574; Ross-shire, £17,967; and Banffshire, £14,323.

In the aggregate totals for the five years, Aberdeenshire kept its premier position with a magnificent total contribution of £116,924, representing, approximately, 17 per cent of the total contributions made by the Area Committees. Perthshire retained second place, with a splendid total of £79,796, closely followed by Angus—also

retaining its third position—with £75,448. Other notable totals included those from Banffshire, £50,976; Fife, £43,605; Ross-shire, £38,648; Kirkcudbrightshire, £37,225; Dumfriesshire, £30,767; Kincardineshire, £24,387; and Roxburghshire, £22,921. Throughout the list other important contributions—as to which limitations of space prevent special mention—may also be noted.

VICTORY GARDEN SHOWS AND SALES.

Season 1944 proved to be another successful one, and, continuing the sequence of progressive returns, a total of **£8271, 12s. Od.** was sent in as the result of the various Victory Garden Shows and Sales held.

The following list gives the returns for the past four seasons :—

Season 1941	£1,914 16 1
Season 1942	3,888 15 7
Season 1943	7,944 7 8
Season 1944	8,271 12 0
	£22,019 11 4
Various sums contributed in 1940	118 14 0
Grand total	<u>£22,138 5 4</u>

Shows and Sales were held in various districts, mostly during August and September. In each succeeding season the Executives of Garden and Allotment Societies and Associations continued to develop and intensify their efforts, to such good effect that further new records were established. Several returns are indeed outstanding. The Committee of this Fund records, with pleasure, that the various Associations and Societies responded with alacrity to the further calls made on them and their public.

As indicating the substantial support accorded, the following list shows the leading returns for Season 1944 :—

Ballantrae (Ayrshire)	£966	Whitburn (West Lothian)	£256
Bonnybridge (Stirlingshire)	611	Balloch (Dumbartonshire)	214
Carmyle (Glasgow)	565	Kennoway (Fife)	202
Royal Caledonian Horticultural Society (Edinburgh)	400	Bishopshire (Kinross-shire)	185
Longcroft (Stirlingshire)	400	Hillington (Renfrewshire)	181
Parkhead and Sighthill (Edinburgh)	340	Newlands (Glasgow)	176
Leven (Fife)	310	Inverurie (Aberdeenshire)	175
Oban (Argyll)	300	Chirnside (Berwickshire)	157
Misses Logan Home, Silverwells (Berwickshire)	293	Corstorphine (Edinburgh)	141
Burnside Wardens (Glasgow)	285	Kirkcaldy (Fife)	111
Bridge of Allan (Stirlingshire)	285	Scottish Dyes Recreation Club, Grangemouth	109
		Musselburgh (Midlothian)	100
		Taynuilt (Argyll)	100

Limitations of space preclude the mention of all contributions made, and it is accordingly necessary to confine these references to the leading contributors. In the official List of Contributions will be found evidence of the excellent support given by the various Associations and Societies. It is gratefully acknowledged, however, that the efforts of those Committees which have not been specially referred to above had many outstanding and praiseworthy returns to their credit, more especially as their field of appeal was affected by various factors. In some cases, by reason of a limited public, the revenue could not be expected to be heavy; in other cases, the fullest measure of success of the Shows or Sales was not reached owing to unfavourable weather conditions.

A remarkable and notable contribution of £966 was made by the Ballantrae Victory Garden Show Committee, as the result of various enterprises. That return makes it, therefore, the leading contribution in the Victory Garden section. The Executive and supporters of the Ballantrae Committee must be congratulated on the successful outcome of their several projects and on the extent of the resulting benefit to the Fund.

The season's returns have been marked by a number of heavily increased contributions. An exceptionally fine one of £611 was made by Bonnybridge Gardens and Allotments Association, whose vigorous Committee had set themselves to attain an ever higher target. Carmyle Gardens and Allotments Committee (Glasgow) maintained its forward position with a splendid contribution of £565. Here, again, its enthusiastic team of executives were animated by the desire to reach an ever higher level. The Royal Caledonian Horticultural Society and the Longcroft and District Flower and Vegetable Show Committee maintained their strong support of the Fund with contributions of £400 each. Parkhead and Sighthill Horticultural Society (Edinburgh) made a first-rate return of £340, and otherwise throughout the lists may be observed other notable contributions. An interesting and welcome contribution received during the past season was that of £293 from the Misses Logan Home, Silverwells, Coldingham, realised from the holding of a Garden Fête.

The following list, showing the aggregate of sums sent in by the leading contributors to the Fund during past seasons, is evidence of the splendid and successful endeavours which have been made in support of the Fund:—

Ballantrae (Ayrshire) . . .	£1316	Parkhead and Sighthill (Edinburgh) . . .	£518
Royal Caledonian Horticultural Society (Edinburgh) . . .	1090	Bishopshire (Kinross-shire) . . .	504
Bonnybridge (Stirlingshire) . . .	1071	Hillington (Renfrewshire) . . .	500
Carmyle (Glasgow) . . .	1060	Burnside Wards (Glasgow) . . .	499
Kirkcaldy (Fife) . . .	993	Kennoway (Fife) . . .	479
Longcroft (Stirlingshire) . . .	901	Bridge of Allan (Stirlingshire) . . .	441
Leven (Fife) . . .	820	Dalmellington (Ayrshire) . . .	420
Oban (Argyll) . . .	738	Chirnside (Berwickshire) . . .	404
Whitburn (West Lothian) . . .	569	Balloch (Dumbartonshire) . . .	394
Haddington (East Lothian) . . .	547	Inverurie (Aberdeenshire) . . .	384
		Newlands (Glasgow) . . .	341

As already shown, the grand total raised by Horticultural and Allotment Associations during these past seasons amounts to £22,138. Those who have shared in the accumulation of this considerable total will find satisfaction in the fact that the funds were used for a very valuable and vital purpose, as our returned prisoners of war have freely testified. Once more the General Committee acknowledges, with admiration and gratitude, the industry and co-operation of the Executives and Members of the Scottish Horticultural Societies and Associations which have made possible this splendid total.

FARM WORKERS' CONTRIBUTIONS.

Contributions by Farm Workers for the year amounted to £444, 18s. 10d., as against £387, 12s. 3d. received in the preceding year. As has been stated in previous Reports, this revenue represents only a small proportion of the total support given to the Red Cross by Farm Workers in Scotland. Many Workers, having associated themselves with existing Penny-a-Week schemes, have continued to support their local efforts with which they had initially linked up. In addition to these direct contributions, they have also co-operated and given valued assistance in the work of the County and Area Committees in the various schemes instituted for the benefit of this Fund of the Red Cross.

The grand total of Penny-a-Week contributions to this Fund now amounts to £1585, 13s. 6d.

Of the total of £444, 18s. 10d. contributed this year, more than one-half—£222, 11s. 3d.—was returned by the Farm Workers of East Lothian. In other ways also they have rendered valuable assistance to the Red Cross, notably by the establishment of an Annual Horse Parade at Haddington. The record of the East Lothian Farm Workers is one of special merit.

Dalkeith and Duns centres continued to support the Fund with substantial amounts, and other centres sending in these welcome contributions included Dornoch, Dufftown, Hawick, Kelso, Lanark, Lockerbie, Newcastleton, Peebles, St Boswells, South Ayrshire, Tain, and Udny.

The grateful thanks of the Committee is accorded to all Farm Workers contributing, and to all collectors and others concerned in these transactions.

OTHER CONTRIBUTIONS.

Many organisations and individuals have furthered the progress of the Fund by the institution of special appeals, and by the promotion of Whist Drives, Dances, and other forms of endeavour. It is with pleasure that reference is now made—necessarily a limited one—to several of these varied enterprises, in respect of which the aggregate contributions amounted to £14,770, 5s. 7d.

The Fourth Appeal of the National Association of Corn and Agricultural Merchants having concluded, Mr D. Jeffrey Aitken,

O.B.E., the Scottish Secretary, was able to send in, as a resulting donation, the excellent total of £1945. In addition, and relative to that Appeal, further sums will eventually be added to the total in respect of income tax reclaimable under Bonds of Annuity granted by various members of that body. Members supporting the Fourth Appeal included those in the Western, Northern, Berwick, and Eastern Branches of the Association. Altogether, to date, the Scottish Council has made over, as the result of its four Appeals, a total of £15,096. The General Committee has sincerely welcomed the cordial co-operation and extensive support so generously offered by the members of the Scottish Council of the Association.

A sum of £1065 was made over by the Ayrshire Cattle Herd Book Society, being a balance in hand of the proceeds of the sale of animals gifted by members of the Society and sold at various centres. In the previous year Mr Hugh Bone, its Secretary, had forwarded the main contribution of £12,000 arising from these sources. The total received from this special effort of the Ayrshire Cattle Herd Book Society was therefore £13,065. This exceptionally substantial contribution has well merited the grateful appreciation of the General Committee, and its cordial thanks are accorded to the executives and members of the Society for initiating and bringing the scheme to such a successful conclusion.

Mr R. Brewis Anderson, for the Scottish Shorthorn Breeders' Association, forwarded a sum of £840 raised in similar fashion by sales of stock gifted by members, as well as by direct contributions; while the Highland Cattle Society of Scotland, through its Secretary, Mr John Stewart, sent in a sum of £206 similarly raised.

When it is remembered that members of these Breed Societies have, in addition, contributed individually and extensively to the funds of the Area Committee in their own counties, the further and special appeals directed to them as members of Breed Societies will serve to emphasise that fine quality of generosity existing in the agricultural community and the unfailing response made to all calls.

Scottish Agricultural Industries Ltd., in association with its branches and subsidiary companies trading in the Scottish area, sent in £500—the fourth contribution. From members of the Wool Federation of Scotland Ltd. subscriptions amounting to £36 were received. A further gratifying renewal of donation was that of 100 guineas made by the British Basket and Besto Co., Ltd., Glasgow—its third donation.

Grants from the County War Funds were renewed. From the War Schemes Fund of the Lord Lieutenant of Wigtownshire a valued grant of £1000 was made to the Fund, and from the County of Dumbarton War Benevolent Fund £500.

Amongst established schemes yielding periodical contributions were the registered milk producers of the Aberdeen and District Milk Marketing Board. The staff of the Edinburgh and East of Scotland College of Agriculture continued to send their quarterly contributions with unfailing regularity, and welcome gifts were made by the staff of the Institute of Animal Genetics, Edinburgh.

From that enterprising District Society—the Strathaven and District Agricultural Exposition—a much-appreciated grant of £500 was received from their funds. Stirling District Clydesdale Horse Society renewed its support with a donation of £30, as also the Mauchline Tractor Ploughing Association with one of £38. The Farm Servants of East Lothian—out of the proceeds of their 1944 Horse Parade held at Haddington—sent in a worthy contribution of £166.

Of numerous Whist Drives and Dances held through which the Fund ultimately benefited, mention may be made of the following: the staff of South Ayrshire Agricultural Executive Committee, £112; Shettleston and Chryston Branch of the N.F.U., £100; Kincardineshire Farmers' Club, £87; Auchenclosh Farm Staff (Dumfriesshire), £80; Campsie, Strathblane, and Baldernock Agricultural Society, £49; Mr Alexander Waddell, Dewshill, Salsburgh, £36; and Whitburn Agricultural Society, £29.

The Fund was greatly indebted to Young Farmer Clubs for much spirited action and help. In addition to supporting the organisation of the Area Committees in their respective counties, many of the Clubs also arranged independent functions such as Whist Drives, Dances, and Dramatic Performances. Amongst these the East Kilbride Club provided the Fund with a magnificent gift of £700 out of the proceeds of a Gymkhana held in 1941. Another enterprising Club—the West of Fife—brought up its total of donations for the year to £403, including the proceeds of a Horse Show, a Ploughing Match, and a Dance. Other Clubs according valued support included Alford, £91; Avondale, £21; Biggar, £20; Carrick, £31; Carse of Gowrie, £29; Crossroads, £30; Edinburgh, £87; Kilmaurs, £62; Lockerbie, £24; Loch Lomond, £50; Loudoun and Galston, £60; Lybster, £31; and Strathendrick, £51.

Donations which gave special pleasure were those from the Officers, Petty Officers, Ratings, and Wrens of the Royal Naval Air Station, Orail. Their monthly contributions for the past year—earmarked for the Prisoners-of-War Fund—amounted to the handsome total of £397.

The Ballindalloch War Work Party sent in an excellent gift of £302. In Midlothian, Oxenfoord Home Farm Committee made a generous donation of £184, being the proceeds of Sheep Dog Trials and a Sports Meeting. The boys of Loretto School, Musselburgh, again made over to the Fund the amount of the earnings due to them for their seasonal work in local Market Gardens.

A Demonstration of New Farm Implements was held by the Highland and Agricultural Society of Scotland at Castleton, Bessie, Angus, in April 1944. Collections made on the field by members of Angus V.A.D. realised £221, and, in addition, the Fund benefited to the extent of £111 through the kindly action of various exhibitors in making over the amount of their deposit fees to the Fund.

Many more donations appear in the list of contributions, and though they have not been specially referred to in this short résumé,

it will be understood by the donors that nevertheless they were heartily welcomed.

The General Committee is warmly grateful to all donors whose kindly thoughts prompted them to arrange ways and means to assist and for the resulting and substantial benefits which have flowed to this Fund.

ACKNOWLEDGMENTS.

It is only necessary to repeat that nine-tenths of the income of the Fund during its fifth year was derived from the activities of the Area Committees to show how much the Fund is indebted to these Committees for its success. It is a remarkable fact that instead of falling off, most Committees succeeded in raising larger sums than in the preceding years. That this was done in spite of war weariness, shortage of staffs, difficulties of transport, and limitation of supplies of every kind bears ample testimony to the marvellous enthusiasm and perseverance of both members and officials of these Committees. They obviously were determined that, whatever happened, the necessities of the Red Cross should be met and our prisoners of war should be fed.

In their efforts the Area Committees have been successful in attracting the help and co-operation of other organisations in their areas. Amongst these special mention may again be made of the Women's Rural Institutes and other women's organisations. In many areas, Ladies' Committees have been highly successful in their efforts and have raised substantial sums for the Fund. Young Farmers' Clubs have also given extremely valuable contributions. Acknowledgment must again be made of the warm support given to many Committees by the people of the towns and burghs in their area. As previously reported, there are notable instances where not only have Town Councils been helpful, but civic heads have acted as Conveners of Area Committees with outstanding success. To the Area Committees, their Conveners, Members, Secretaries and Treasurers, and all associated with them in their marvellous effort, the Committee of the Fund acknowledges its debt of gratitude. To them, in outstanding measure, is due the credit that in this, its fifth year, the Agriculture Fund has been enabled to attain a new proud record of contributions to the Red Cross.

While Free Gift Sales have ceased to be regarded as the sole method of raising money, there were few areas in which a Free Gift Sale did not figure as an important part of the scheme. At both Castle Douglas and Dingwall the main effort was centred in a Free Gift Sale. These Sales, as previously acknowledged, could not have been held without the cordial help and co-operation of the Live Stock Auctioneers, who gave freely of their services, the services of their staffs, and the use of their marts. In many cases the Auctioneers were closely associated with the formation of the Area Committees, and some acted as Conveners, while members

of their staffs acted as Secretaries and Treasurers. The magnificent help given by the Auctioneers, and the generous assistance rendered so ungrudgingly by their staffs, has undoubtedly been responsible for the unprecedented success of the Free Gift Sales in the past year. The Committee gladly acknowledges its indebtedness to them, and places on record its high appreciation of the valuable work done by them on behalf of the Fund.

The Fund has continued throughout the year to benefit from the whole-hearted support of Directors and Members of the Highland and Agricultural Society, the Council, Members and Officials of the National Farmers' Union and Chamber of Agriculture of Scotland, and the Office-bearers and members of County and District Agricultural Societies. The representatives of these bodies have constituted the solid framework of the Area Committees, and have worked together with notable success. In some cases local branches of the N.F.U. and Chamber have willingly undertaken the duties of Area Committees with marked benefit to the cause. In other cases a similar service has been performed by County and District Agricultural Societies, with equally beneficial results for the Fund. To these bodies, and to their efficient and hard-working Office-bearers and Officials, the Committee again extends its most cordial and grateful thanks.

The thanks of the Committee to Horticultural Societies and Allotment Associations, to Farm Workers, and to various commercial interests and Agricultural Societies and Associations, have been expressed in preceding sections of this Report dealing with these matters.

The Scottish Press has continued throughout the year to give valuable publicity to the activities and progress of the Fund. Both agricultural and daily newspapers have regularly given prominence to news and items of interest relating to the Fund. Without such publicity the Fund could not have attained its present position, and the Committee have pleasure in placing on record their sense of the valuable services rendered to the Fund by the Scottish Press.

The thanks of the Committee are also due to the Royal Bank of Scotland which, throughout the past five years, has waived all charges on cheques passing through the bank. This concession constituted a substantial contribution to the Fund.

RED CROSS AGRICULTURE FUND IN ENGLAND.

The Committee has continued to work in the closest and most cordial relations with the Red Cross Agriculture Fund Committee in England. The activities of that Committee are comprehensive and organised on an extensive scale. The efficiency of the organisation and the enthusiasm and energy with which their various enterprises have been carried through may be judged from the fact that no less a sum than £6½ million was raised during the five years to 1st March 1945. Many of their schemes have no counterpart in Scotland, but the Scottish Fund has not suffered from that

fact. Where such schemes as "Dogs of Britain" and "Racing Pigeons," &c., attracted contributions from Scotland, these were duly handed over to the Scottish Fund, with a detailed statement, at the end of each month. During the past year a sum of £2223 was received in this way.

Throughout the year the Chairman of the Committee, Mr R. W. Haddon, C.B.E., and the Secretary, Mr Alec D. Robertson, have continued to extend every facility and courtesy to the Scottish Committee. Full information regarding their Committee's many activities were freely placed at our disposal. The co-operation between the two Committees has been a happy and a profitable one for the Scottish Fund. In Mr Robertson, the able and energetic Secretary of the English Committee, the Scottish Fund has had a valuable friend and wise counsellor, whose guidance and advice has constantly been available, and whose inestimable help is gratefully acknowledged.

JOHN STIRTON,

Hon. Secretary and Treasurer.

8 EGLINTON CRESCENT,
EDINBURGH 12, 13th July 1945.

ABSTRACT OF RECEIPTS AND PAYMENTS BY THE HON. SECRETARY
AND TREASURER FOR THE FIFTH FINANCIAL YEAR, 17TH APRIL 1944
TO 16TH APRIL 1945.

<i>4th Year— 1943-44.</i>	<i>Receipts.</i>	<i>5th Year— 1944-45.</i>
	1. Sums raised by Area or Centre Committees, being the proceeds of Free Gift Sales, Voluntary Levies or Assessments, Collections, &c.	£189,809 9 8
£137,379 2 10	2. Victory Garden Shows—Proceeds of Shows and Sales held by Horticultural and Allotment Societies, also Donations, &c. —Season 1944	8,271 12 0
7,944 7 8	3. Contributions from Farm Workers (Penny-a-Week Scheme)	444 18 10
387 12 3	4. Agricultural and Allied Bodies—	
665 12 5	(1) Donations, &c.	£864 10 2
1,630 5 6	(2) Proceeds of Whist Drives and Dances, &c.	1,689 1 6
		2,553 11 8
7,020 3 1	5. Agricultural and Commercial Interests—	
450 0 0	Donations, &c.	5,948 11 10
	6. Grants from County War Funds	1,500 0 0
12,000 0 0	7. Scottish Breed Societies—Donations by Members	2,111 11 5
3,871 6 7	8. Unclassified Contributions (including Special Contributions for Prisoners-of-War Parcels Fund)	2,656 10 8
£171,348 10 4		£213,296 6 1
90 6 0	9. Interest on sums placed on Deposit Receipt for short periods	124 13 6
<u>£171,438 16 4</u>		<u>£213,420 19 7</u>
	<i>Payments.</i>	
	1. Expenses of Administration—	
£30 0 0	(1) Postages	£30 0 0
32 19 0	(2) Stationery, &c.	24 8 2
158 2 2	(3) Printing, &c.	107 10 3
11 5 3	(4) Travelling Expenses and Outlays	13 7 4
	(5) Miscellaneous Payments	9 13 5
£232 6 5	Total	£184 19
232 6 5	Received from the Highland and Agricultural Society of Scotland to defray expenses	184 19
	2. Payments to benefiting Charities—	
£163,065 2 1	(1) Scottish Branch, British Red Cross Society	£203,811 10 8
8,373 14 3	(2) St Andrew's Ambulance Association	9,609 8 11
£171,438 16 4		£213,420 19 7
<u>£171,438 16 4</u>		<u>£213,420 19 7</u>

EDINBURGH, 15th June 1945.—I have examined the Books and Accounts of the Treasurer of THE SCOTTISH RED CROSS AGRICULTURE FUND COMMITTEE, of which the foregoing is an Abstract, and have found the same to be correctly stated, and sufficiently vouched and instructed.

GEO. JAMES GREGOR, C.A., *Hon. Auditor.*

List of Conveners and Secretaries, &c., of the Area Committees

Centre.	
ABERDEEN	<i>Comener</i> —Lord Provost Sir Thomas G. Mitchell, Aberdeen <i>Hon. Secretary</i> —Robert C. May, Advocate, 77 Crown Street, Aberdeen
ABERFELDY	<i>Comener</i> —Provost J. D. Haggart, O.B.E., Aberfeldy <i>Hon. Secretary</i> —R. J. Cameron, Bank of Scotland, Aberfeldy
ALFORD	<i>Comener</i> —Alexander Philip, Wester Bowls, Leochel Cushnie <i>Joint Hon. Secretaries and Treasurers</i> —W. A. P. Cormack, Norwood, Alford, W. A. Lawson, Scotsmill, Tullynessle, Alford
ANNAN	<i>Comener</i> — <i>Vice Comener</i> —Andrew R. Semple, Charlesfield, Annan <i>Hon. Secretary</i> —Alec Knox, Solicitor, British Linen Bank, Annan
ANSTRUTHER	<i>Comener</i> —R. F. Logan, Kirkmoy, Crail <i>Hon. Secretary</i> —J. Gordon Dow, Solicitor, Anstruther
ARBRATH	<i>Joint Conveners</i> —H. W. Dodds (Scott & Graham Ltd.), Arbroath, Percy E. Morgan, Windyhill, Arbroath <i>Hon. Secretary</i> —Mrs J. B. Maikle, 1 Golf Avenue, Monifieth <i>Hon. Treasurer</i> —W. Stark, British Linen Bank, Arbroath <i>Correspondent</i> —H. S. M. Nicol, Royal Bank of Scotland, Brodick
ARFAN	<i>Comener</i> —General Sir Charles Ferguson, G.C.B., G.C.M.G., D.S.O., &c., of Kilkerran, Bt., Maybole
AYR (South Ayrshire)	<i>Hon. Secretary</i> —Hugh Done, 1 Racecourse Road, Ayr <i>Comener</i> —G. Davidson, Nether Balfour, Durris, Drumoak <i>Hon. Secretary</i> —David Humble, The Ley, Banchoy
BANCHORY	<i>Joint Conveners</i> —Provost John C. II. Addison, Banff James A. Davidson, Culhuculy, Banff
BANFF & CORN HILL (Lower Banffshire)	<i>Hon. Secretary</i> —James M. Simpson, M.A., LL.B., Solicitor, Banff <i>Comener</i> —Robin G. Murray, Spittal, Biggar
BIGGAR	<i>Hon. Secretary</i> —James Noble, Gowanlea, Symington, Biggar <i>Hon. Treasurer</i> —Alexander Foster, National Bank of Scotland, Biggar. <i>Comener</i> —Rev. A. Whyte Smith, The Manse, Bendochy, Coupar Angus.
BLAIRGOWRIE	<i>Hon. Secretary</i> —William Inverarity, O.A., Blairgowrie
BRECHIN	<i>Joint Conveners</i> —W. Arnot, Fithie, Brechin, W. D. Mackenzie (The Farmers' Mart Ltd.), Brechin <i>Hon. Secretary</i> —George White (The Farmers' Mart Ltd.), Brechin <i>Chairman</i> —R. G. D. Thomas of Southwick, Dumfries
CASTLE DOUGLAS	<i>Hon. Secretary and Treasurer</i> —Richard J. Singer, F.I.A. (Scot.) (Wallets' Marts Ltd.), Castle Douglas
CLUNY, &c.	<i>Conveners</i> —Lady Grant of Monymusk, Mrs Claeson Gordon of Cluny, Cluny Castle, Cluny <i>Joint Hon. Secretaries</i> —H. R. Mollison, J.P., Cluny Estates Office, Aberdeen, A. W. M. Whiteley, The Schoolhouse, Monymusk <i>Hon. Treasurer</i> —J. Milton, J.P., Bank House, Sauchen
CRITTY, &c. (Strathearn)	<i>Joint Conveners</i> —Sir J. Denby Roberts, Bt., Strathallan Castle, Auchterarder, Duncan M. Stewart of Millhills, Crief <i>Hon. Secretary</i> —John D. S. Miller, M.A., B.L., 14 Cornie Street, Crief
CROMF & UPPER DIESIDE	<i>Comener</i> —Lieut. Colonel W. Lulburn of Coull, Aboyne <i>Hon. Secretary and Treasurer</i> —J. T. Taylor, Bank House, Tarland.
CUPAR	<i>Comener</i> —David Blair, Littlemech, Wormit, Fife <i>Hon. Secretary</i> —William Wilson, W.S., Cupar Fife
DALKEITH	<i>Comener</i> —John M'Morian, Tynehead Farm, Tynehead, Midlothian. <i>Hon. Secretary</i> —D. M. Webster (John Swan & Sons Ltd., Auctioneers), 5 Clifton Terrace, Edinburgh
DINGWALL	<i>Conveners</i> —J. Houston, Scatwell, Muir of Ord, Mrs MacWilliam, Gaigston, Muir of Ord <i>Vice Conveners</i> —A. Mann, Munalehouse, Avoch, Miss Moore, Drummond, Dyanton, A. Macdonald, Conon Brae, Conon Bridge <i>Hon. Secretary</i> —T. H. Burns, Solicitor Dingwall
DORNOCH	<i>Comener</i> —G. J. Grant, Pulrossie, Dornoch <i>Hon. Secretary</i> —D. G. Munio, Cyderhall, Dornoch <i>Hon. Treasurer</i> —D. E. Lindsay, North of Scotland Bank, Dornoch
DUFFTOWN	<i>Comener</i> —Hugh M'Vean, M.R.C.V.S., Craigellachie <i>Hon. Secretary</i> —J. S. Shuch, North of Scotland Bank, Dufftown
DUMFRIES	<i>Comener</i> —James Wylie, Beaumont, Victoria Road, Dumfries <i>Hon. Secretary</i> —James Henderson, Solicitor, Dumfries
DUNDEE	<i>Joint Conveners</i> —Alan Fraser (Peter M'Intyre Ltd., Auctioneers), Dundee, J. B. Boyd, Goudie Home Farm, by Dundee <i>Hon. Secretaries</i> —J. Grafton Lawson & Co., Solicitors, Dundee
DUNFERMLINE	<i>Comener</i> —William Dick, Transy, Dunfermline <i>Hon. Secretary and Treasurer</i> —W. Craig Husband, Union Bank Chambers, Dunfermline
DUNS	<i>Comener</i> —James Clark, Jun., Edington Mains, Duns <i>Hon. Secretary and Treasurer</i> —A. C. Fotheringham, The Bowes, Gordon

- Centre.**
EDINBURGH . *Convener*—Robert Park, Brunstane, Portobello, Midlothian.
Hon. Secretary—Miss Ann Cowan Telfer, Royal Bank of Scotland, Hope Street, Edinburgh.
- ELGIN, FORRES, & C.** . *Convener*—John Fettes, Corskie, Garmouth.
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THE CEREAL AND OTHER CROPS OF SCOTLAND FOR 1944.

THE following comparison of the cereal and other crops of 1944 with those of the previous year has been prepared by the Secretary of the Society from answers to queries sent to leading agriculturists in different parts of the country.

The queries issued by the Secretary were in the following terms :—

1. What was the quantity, per imperial acre, and quality of grain and straw as compared with last year, of the following crops ? The quantity of each crop to be stated in bushels or cwts. What quantity of seed is generally sown per acre ?—(1) Wheat, (2) Barley, (3) Oats.
2. Did the harvest begin at the usual time, or did it begin before or after the usual time ? and if so, how long ?
3. What was the quantity, per imperial acre, and quality of the hay crop, as compared with last year, both as regards ryegrass and clover respectively ? The quantity to be stated in tons and cwts.
4. Was the meadow hay crop more or less productive than last year ?
5. What was the yield of the potato crop, per imperial acre, as compared with last year ? The quantity to be stated in tons and cwts. Was there any disease ? and if so, to what extent, and when did it commence ? Were any new varieties planted, and with what result ?
6. What was the weight of the turnip crop, per imperial acre, and the quality, as compared with last year ? The weight of the turnip crop to be stated in tons and cwts. How did the crop braird ? Was more than one sowing required ? and why ?
7. Were the crops injured by insects ? State the kinds of insects. Was the damage greater or less than usual ?
8. Were the crops injured by weeds ? State the kinds of weeds. Was the damage greater or less than usual ?
9. Were the pastures during the season of average growth and quality with last year ?
10. How did stock thrive on them ?
11. Have cattle and sheep been free from disease ?
12. What was the quality of the clip of wool, and was it over or under the average ?

From the answers received, the following notes and statistics have been compiled:—

EDINBURGH DISTRICT.

WEST LOTHIAN. *Wheat*—(Autumn sown), 38 to 46 bushels, (spring sown), 36 to 44 bushels per acre; grain and straw somewhat affected by weather; some grain sprouted before being cut; seed sown, $3\frac{1}{2}$ to 4 bushels per acre. *Barley*—46 to 56 bushels per acre; grain and straw of good quality; withstood the bad weather better than oats or wheat; seed sown, 3 to $3\frac{1}{2}$ bushels per acre. *Oats*—60 to 80 bushels per acre; grain and straw damaged by weather; seed sown, $4\frac{1}{2}$ to 6 bushels per acre. *Harvest*—One of the longest for years; cutting started about the usual time in broken weather, which continued till the middle of September, when high winds saved many of the crops; very small percentage of crop secured in good condition. *Hay*—40 to 50 cwt. per acre; hay cut during last week of June and first two of July was lost owing to bad weather. *Meadow Hay*—Very little grown. *Potatoes*—Earlies, 10 to 12 tons per acre; main crops, 8 to 10 tons per acre; disease in main crop varieties worst for years; up to 50 per cent of diseased tubers; no new varieties planted. *Turnips*—20 to 25 tons per acre; a fair crop all over; braided well; no resowing required. *Insects*—Slight damage caused by wireworms to the white crops; a few fields of potatoes damaged by slugs. *Weeds*—A constant fight all year against annual weeds in the potato and turnip crops; difficult to kill owing to wet spring and summer. *Pastures*—Average in growth and quality. *Live Stock*—Throve well, despite so much wet weather. Cattle and sheep free from disease. *Clip of Wool*—Average quality and clip.

EAST LOTHIAN (Upper). *Wheat*—Bulky crop, 40 to 48 bushels per acre; quality of grain and straw poor. *Barley*—Badly laid; 40 bushels per acre; quality of grain and straw poor. *Oats*—56 bushels per acre; quality of grain and straw poor. *Harvest*—Started about last week in August; was protracted by bad weather, and dragged on to end of October; one of worst harvests in living memory; crop badly spoiled. *Hay*—2 to $2\frac{1}{2}$ tons per acre; quality much below average owing to wet weather. *Meadow Hay*—None grown. *Potatoes*—2 tons per acre less than last year, making the average yield 5 to 6 tons per acre; disease, beginning in August, was very bad; no new varieties grown; harvest very protracted owing to bad weather. *Turnips*—Good; 20 to 25 tons per acre; braided well; one sowing only. *Insects*—No damage reported. *Weeds*—No extensive loss caused. *Pastures*—More than average growth owing to wet weather; quality poor. *Live Stock*—Did not do as well as usual owing to lack of sunshine. Cattle and sheep were generally free from disease. *Clip of Wool*—Quality good; average quantity.

EAST LOTHIAN (Lower). *Wheat*—Soft and bulky; much laid; average 48 bushels per acre; straw about 2 tons per acre; seed sown, 3 to 4 bushels per acre. *Barley*—Most crops badly laid and good samples scarce; average 56 bushels per acre, about the same as previous year; seed sown, $2\frac{1}{2}$ to $3\frac{1}{2}$ bushels per acre. *Oats*—Badly laid and very troublesome to cut; about 80 bushels per acre on average; very few good seed samples. *Harvest*—Commenced about end of first week in August, but never properly finished. *Hay*—Ryegrass; a good average crop; mostly badly spoiled in the making; $2\frac{1}{2}$ to 3 tons per acre. *Meadow Hay*—None grown. *Potatoes*—Earlies, a good average crop; lifting began about 20th June; lates, the lightest

crops for some years; average about 7 tons per acre; 3 tons per acre lighter than previous year. *Turnips*—A good crop; wet season an advantage, but weeds plentiful; weather gave no opportunity for cleaning. *Insects*—Not so much in evidence as usual, perhaps due to wet season. *Weeds*—Abundant everywhere. *Pastures*—Good. *Live Stock*—Did not thrive really well, the season being too wet. Cattle and sheep generally were free from disease. *Clip of Wool*—Average. *General Remarks*—Crops all made a promising start after a very fine dry winter and spring. Rain started about the beginning of June, and from then till the end of the year there was not a week without rain. This, together with a shortage of labour, spelt disaster. For the first time in living memory many fields of grain in this district were never harvested. This in spite of the fact that combine grain harvesters were used on a fairly large scale. Potatoes were in many cases struck with blight, and some fields were not dug.

BORDER DISTRICT.

BERWICKSHIRE (Merse). *Wheat*—Both winter and spring considerably below average, in some instances as low as 24 bushels per acre; average 32 bushels per acre; bushel weight low, 60 to 61 lb.; straw good quality but somewhat broken, 26 cwt. per acre; seed sown, normally, 3 to 4 bushels per acre. *Barley*—Very varied but generally well below average, with 48 bushels per acre at best; average little over 34 bushels per acre; bushel weight of many fields very low; average 52 to 53 lb.; straw indifferent quality; 23 cwt per acre; seed sown, 2½ bushels per acre. *Oats*—A heavy good crop, with much loss during harvest; average, 44 bushels per acre, of too often very indifferent quality; average natural weight frequently below 40 lb. per bushel; straw bulky, but indifferent fodder; seed sown, usually 5 to 5½ bushels per acre. *Harvest*—Began about the usual time; some 10 per cent of the crop (mostly barley) never completed, and it was well into October before the bulk was secured, much in very indifferent condition, and a quantity of wheat in particular spoilt by sprouting; combines helped to save the situation to some extent for those who possessed them. *Hay*—A good crop of 30 to 35 cwt. per acre, more or less damaged by weather conditions; grasses and clover well mixed. *Meadow Hay*—Promised well, but much was spoilt in making; 25 cwt. per acre. *Potatoes*—Very disappointing; blight was most prevalent; crop at lifting time by no means good, and disease spread very rapidly in pits, making output exceedingly low; instances of a shrinkage of 50 per cent were not unknown, and the total return of sound potatoes would barely reach 5 tons per acre; some 200 acres were lifted in the month of March; the balance (50 per cent) of the crop was good and saleable. *Turnips*—The one crop the season seemed to suit; many fields produced the best crop for some years; yields of 30 tons per acre and over not uncommon; average 24 tons per acre; there was no resowing, and braids came away quickly. *Insects*—Signs of damage by turnip moth at one period, but the crop recovered. *Weeds*—Annual and perennial decidedly on the increase; too few hands available to get over the ground. *Pastures*—Average to increased growth, but quality distinctly poor. *Live Stock*—Fair to moderate in most cases; no disease out of the usual among cattle and sheep. *Clip of Wool*—Quality good, but below average in weight.

BERWICKSHIRE (Lammermoor). *Wheat*—Winter wheat was late sown; germination poor and some fields had to be reploughed; some crops badly

affected by wireworm and leather-jacket, and where wheat followed wheat crops were subject to Eye Spot and Take All; yellow rust much less troublesome than in 1943; yield, 36 to 40 bushels per acre; seed sown, 4 bushels per acre. *Barley*—Acreage increased by 20 per cent; crop very badly laid, which affected the yield; average, 30 to 40 bushels per acre; seed sown, 3 to 3½ bushels per acre. *Oats*—Crop very well grown but badly laid; yield poor, from 36 to 48 bushels per acre; seed sown, 4 to 6 bushels per acre. *Harvest*—Began early, about the third week in August, but owing to lodging, intermittent wet weather, and a general shortage of skilled labour, continued into November; one of the worst for fifty years, much grain being lost altogether. *Hay*—Similar in weight to last year, but much of it grazed too late; weather was good at the start, but soon broke, and good hay was very difficult to make. *Meadow Hay*—A good crop and fairly well secured. *Potatoes*—Area increased by 800 acres; mosaic worse than usual, and very few crops qualified for stock seed; lifting very protracted owing to bad weather and shortage of labour; blight was general towards end of growing season; did not keep well in the pits; yield poor, 5 to 7 tons per acre. *Turnips*—Much work put into cleaning the land owing to previous cross cropping; swedes came slowly forward, but yellows braided well; a good crop, average about 15 tons per acre. *Insects*—Some damage again to wheat by Wheat Midge and *domonyza ambigua*; less turnip fly trouble than usual; crows and rats continued to do extensive damage. *Weeds*—Everywhere gained the upper hand; a bad year for runches; a good deal of acid-spraying was undertaken, but available machines could not cope with the demand. *Pastures*—Again came away early, but lack of sun and too much rain affected the autumn pastures, and they stood up to grazing very poorly. *Live Stock*—Cattle grazed well; lambs did well up to Lammas, but later suffered a severe check; hill ewes had a full bite by lambing time; in-bye lambings were safely got through, with an extra big crop; hill lambings excellent, with good crops of lambs; the incidence of abortion was not generally so severe, but some farms were affected for the first time; some half-bred flocks lost ewes after lambing from what looked like a deficiency disease of some sort; orf among lambs was very bad, and worms as usual took heavy toll; lamb dysentery bad among hill flocks where inoculation or dosing had been omitted. *Clip of Wool*—Half-bred, quite as good as last year; hill clips barely up to last year's record for weight and quality.

ROXBURGHSHIRE. *Wheat*—A good yield was the exception; average return under 40 bushels per acre; much of the grain was inferior, attributable to unsuitable weather conditions and cross cropping; bulk of straw normal; seed sown, about 4 bushels per acre. *Barley*—Generally unsatisfactory, with large areas badly lodged; much of the grain of poor quality, and yield slightly less than last year, being about 36 bushels per acre; a large bulk of straw mostly of poor quality. *Oats*—Yield rather less than last year; grain on fairly good land about 60 bushels per acre on average; where standing, the straw was good and rather above average quality. *Harvest*—General in the third week of August; some of the earliest cut secured in good condition; thereafter conditions were as bad as they could be; all October and November most of the crops were eventually secured in indifferent condition, but a number of fields were never cut and became a total loss. *Hay*—A full crop; earlier cut well got, but much of the later hay was badly spoiled. *Meadow Hay*—Generally a good crop; earlier cut well got, but the September-cut hay bad. *Potatoes*—Yield was under average, with an unusually large percentage of disease. *Turnips*—Braided well and grew well all season, finishing a record crop.

Insects—Any effect they might have had was unnoticed owing to vigorous growth. *Weeds*—Normal amount of damage; in some cases labour shortage prevented proper cleaning. *Pastures*—Were good all season with plenty of growth. *Live Stock*—Did fairly well, although the lack of sunshine and too much wet weather were detrimental. Cattle were generally free from disease; sheep, especially lambs, were difficult to keep thriving satisfactorily; a considerable amount of pneumonia, being persistent from August onwards. *Clip of Wool*—Both quantity and quality about average.

SSELKIRKSHIRE. *Wheat*—Very little grown. *Barley*—An increased acreage grown; a good crop but rather badly laid in some parts; from 36 to 44 bushels per acre; seed sown, $3\frac{1}{2}$ to 4 bushels per acre. *Oats*—A larger acreage grown; crops heavier than usual but badly twisted and laid; threshed badly with a poor sample of grain; 30 to 44 bushels per acre; seed sown, 5 to 6 bushels per acre. *Harvest*—Commenced about the usual time, but may be classed as "the worst harvest in living memory"; some fields became so badly laid that cutting was almost impossible; with continuous bad weather and shortage of labour leading-in was slow and tedious; the crop was eventually got in in poor condition, some of it having to be stacked on the "dikes." *Hay*—Ryegrass was average and mostly fairly well secured. *Meadow Hay*—Similar to ryegrass crop. *Potatoes*—Very disappointing; on a much-increased acreage and lifted under adverse weather conditions, they did not keep well in pits; about 4 tons per acre, the lowest return for many years. *Turnips*—Generally excellent; some finger-and-toe on wet land, but return well above average. *Insects*—No injury to speak of. *Weeds*—On account of shortage of labour turnips got very dirty, and weeds were impossible to check. *Pastures*—Good all summer on account of continuous rain. *Live Stock*—Lambs lacked condition at the sales, but cattle summered well. Cattle and sheep generally were free from disease. *Clip of Wool*—Average.

Peeblesshire. *Wheat*—Winter wheat sown early was excellent, but did not thresh well generally; 40 to 48 bushels per acre; on some farms it proved a complete failure; spring-sown wheat was very badly laid and threshed even worse; a certain amount of grain was lost through sprouting. *Barley*—Was very badly twisted and laid; on account of the weather there was some second growth; yields below average and in most cases samples poor. *Oats*—An excellent crop, in fact far too heavy; some damage by grub in spring; seemed to ripen prematurely, and there was considerable loss through the grain becoming overripe; harvesting proved costly; yield, 48 to 64 bushels per acre; high districts from 32 to 40 bushels per acre. *Harvest*—Commenced about the usual time; the weather made it one of the worst for a long number of years; oat samples were very poor, and on many farms the cutting could not be completed on account of second growth, and loss occurred. *Hay*—Generally an excellent crop; mostly a one-way cut; good quality; average from 50 to 60 cwt. per acre; a portion lost owing to the uncertain weather conditions. *Meadow Hay*—An average crop. *Potatoes*—Crops not so large as usual; 2 to 5 tons per acre; some blight and a little disease, but quality quite good. *Turnips*—Early sown turnips proved quite good; swedes better than yellows. *Insects*—Some damage by wireworm and grub. *Weeds*—Owing to shortage of labour and the increased acreage tilled, there was rather severe trouble on some farms. *Pastures*—Were excellent. *Live Stock*—Did very well, cattle and sheep being free from disease. *Clip of Wool*—Good quality and average quantity.

DUMFRIES DISTRICT.

DUMFRIES (Annandale). *Wheat*—Large acreage grown; a good crop on suitable land, which should thresh as well as last year; average, 25 cwt. per acre; seed sown, 4 bushels per acre. *Barley*—Large acreage grown; mostly fairly well harvested, but sample not as good as last year; yield 20 to 24 cwt. per acre; seed sown, $2\frac{1}{2}$ to 3 bushels per acre. *Oats*—Acreage similar to last year; crops heavy and badly laid, and generally badly harvested; 50 bushels per acre on the better land, and 28 bushels in the higher districts; seed sown, 4 to 6 bushels per acre. *Harvest*—Started in second week of August and lasted till second week in October in many cases; the worst harvest in living memory owing to continuous rainfall and labour shortage; much grain lost owing to shedding before it could be secured. *Hay*—Ryegrass an average crop, fairly well secured in most cases; 30 cwt. per acre. *Meadow Hay*—A good crop, well secured when cut in good time; 28 cwt. per acre. *Potatoes*—A record acreage grown; crop lighter than last year; a good deal of blight occurred, especially on the damper soils; lifting started second week of October and was mostly done by school children; yield, 7 tons per acre; usual varieties planted. *Turnips*—Scarcely up to average; braided well, but, owing to wet and sunless summer, much finger-and-toe and dry-rot appeared in many fields; yield, 17 tons per acre. *Insects*—Not much trouble experienced. *Weeds*—Seemed to be more plentiful owing to continuous cropping of the same land and through shortage of labour. *Pastures*—Average; mostly heavily stocked owing to small acreage of grass available. *Live Stock*—Did very well during the whole season, and cattle and sheep were generally free from disease. *Clip of Wool*—Good quality, average weight.

DUMFRIES (Nithsdale). *Wheat*—None grown. *Barley*—None grown. *Oats*—A good crop, but badly laid. *Harvest*—Early, and general by end of August; ripened very early considering the wet summer; weather held up stacking; later parts suffered from shedding; later weather very bad; on late places some total losses. *Hay*—A good crop, almost up to last year; well got in most cases. *Meadow Hay*—Hardly so heavy as last year's; very well got. *Potatoes*—A very good crop on some farms, moderate on others; 9 to 10 tons per acre on some farms; considerable disease reported; no new varieties planted; very good quality where crop was sound. *Turnips*—About 14 to 20 tons per acre; braided well; not as dirty as last year; no resowing. *Insects*—No damage reported; wood-pigeons were on the increase. *Weeds*—Came away strongly in end of August. *Pastures*—Not as good as last year's; soft in September and October owing to wet conditions. *Live Stock*—Did fairly well. Cattle and sheep free from disease except for the usual trembling and tick-borne fever in ewes and lambs. *Clip of Wool*—Fairly good; as heavy as last year.

DUMFRIES (Eskdale). *Wheat*—None grown. *Barley*—Very little grown. *Oats*—Crops good, but mostly badly secured owing to wet weather; when got in good order threshed well; about 45 bushels per acre; straw mostly indifferent and not so bulky as last year; seed sown, 5 to 6 bushels per acre. *Harvest*—Started about the same time as last year, but was very much longer in being finished; some small lots were never cut owing to continuous rain. *Hay*—Good, and mostly secured in very good condition. *Meadow Hay*—Good, and when harvested early was got in good condition; later places had great difficulty in getting it at all, but somewhat more was secured this year than last. *Potatoes*—Mostly very poor owing to the wet ground; there was much disease, causing, on many

farms, the loss of half the crop. *Turnips*—Very good and very sound; braided well and came well to the hoe; very little second sowing required. *Insects*—Very little damage caused. *Weeds*—Very bad, mostly on account of the bad weather, as there was little chance to clean the crops; more annual weeds than usual. *Pastures*—With so much wet, got very rough and were difficult to keep down; the quality, although too wet, seemed good. *Live Stock*—Did very well, much better than one would have expected with so much rain. Cattle and sheep both very free from disease, although some farms lost a few hill hogs from braxy before they were inoculated. *Clip of Wool*—About the average in quantity, but quality below last year's, as many sheep were clipped in wet weather and not in good condition.

KIRKCUDBRIGHTSHIRE. *Wheat*—Acreage similar to 1943; yields again rather poor owing to the wet season; very little real wheat-growing land. *Barley*—Acreage similar to last year; crop was badly spoiled by wet harvest. *Oats*—Heaviest crop for many years; owing to the very bad and prolonged harvest at least 25 per cent of the grain was lost; yield, 30 bushels per acre. *Harvest*—Cutting was general by the 14th of August, but an extraordinarily quick ripening period caused 50 per cent of the crops to be too ripe when cut; the extremely wet September and October made the harvesting very difficult, and some was never secured. *Hay*—A very good spell of weather in the second week of July and first week of August enabled an excellent crop to be secured in very good condition; 40 cwt. per acre. *Meadow Hay*—Rather lighter than in 1943, but of excellent quality; 35 cwt. per acre. *Potatoes*—Acreage similar to previous year; crop affected by blight, which was very widespread in most districts by the middle of August; owing to late grain harvest and very wet October raising was very difficult; worst yield for many years; 4 to 5 tons per acre. *Turnips*—15 to 20 tons per acre; considering the wet, sunless season, on the whole an excellent crop; no resowing was necessary. *Insects*—No special trouble recorded. *Weeds*—Again a very bad season for killing weeds in the turnip crop; thistles in grassland not too prevalent. *Pastures*—Grass came early in April, and except for a rather bare time in May was very abundant all season. *Live Stock*—A good season for cattle, but pastures too wet and rank for sheep. No special disease was noticeable in older cattle, but hoose and blackleg were very prevalent in calves. *Clip of Wool*—Good, but rather lighter than in 1943.

WIGTOWNSHIRE. *Wheat*—Very little grown. *Barley*—Very little grown. *Oats*—A good seed-bed was got and oats braided well; grain not so well filled at harvest owing to a sunless summer; and a large proportion of lea oats used for stock feeding; possible average, 38 bushels per acre. *Harvest*—Began about the usual time; better results obtained by those who were early; owing to "summer time" much cutting had to be done in afternoons and evenings; a great proportion of the lea crop was badly laid, and much loss resulted; weather was broken at leading time, and some places did not get it all in owing to shortage of labour. *Hay*—About 2 tons per acre; owing to the weather most of it was not well secured and below average for quality; aftermath only moderate. *Meadow Hay*—About the same as usual. *Potatoes*—Earlies showed a disappointing yield at first, 2 or 3 tons per acre; later they improved to 6 or 8 tons per acre; the digger was greatly used, as labour was scarce; lates were a moderate crop and in some places were diseased; 8 tons per acre, and in some places much less; the weather for lifting them was very bad, even worse than in 1943. *Turnips*—18 tons per acre; braided good, and very little resowing was done; probably owing to the long and continuous

rain in the back-end of the year disease appeared here and there, and affected the keeping qualities for spring use; late turnips very sound. *Insects*—Very little damage done. *Weeds*—Dockens and thistles prevalent; redshank not so strong as usual; weeds grew in lea oats which had been laid, and proved very troublesome. *Pastures*—Hardly so good as in 1943 and got far too much rain in the latter part of the season, but stock always managed to keep them down; little silage was made, but some grass-drying was done. *Live Stock*—Generally did fairly well, but not any better than in 1943; owing to wet weather milk was short in the back-end; grazing for young stock was scarce for the same reason, and they were inclined to be lean; there was about the usual amount of illness among stock; grass sickness and navel ill still with us, while mastitis remained a menace to dairy herds; hoose was very bad in places and many calves were lost; in the only warm week we had, damage to cattle, young and old, was done by clegs; sheep generally did fairly well. *Clip of Wool*—Average.

GLASGOW DISTRICT.

AYRSHIRE. *Wheat*—Grain, 22 cwt. per acre; straw, 20 cwt. per acre; not quite so good as last year, and while secured in moderate condition had a high moisture content at harvest-time; seed sown, usually 3 to 3½ bushels per acre. *Barley*—In some cases disappointing, about 18 cwt. per acre, with 16 cwt. of straw; many crops suffered from wet weather; quality of the grain not so good as last year. *Oats*—Grain, 17 cwt. per acre; straw, 16 cwt. per acre; quality of crop was very much below average with a much larger proportion of light grain; seed sown, 4½ to 5 bushels per acre. *Harvest*—Delayed and much protracted by continuous wet weather; crops suffered seriously from weathering; a number of small areas were never in sufficiently good condition to stack; quality of oat crops, especially, the worst for many years. *Hay*—Yield, 36 cwt. per acre; slightly more than last year; quality not so good; clover not plentiful. *Meadow Hay*—Yield was very similar to last year's, but quality not quite so good. *Potatoes*—7½ tons per acre, slightly more than the previous year; increase was in early potatoes; severe blight appeared about the third week of July and spread rapidly; areas not intended for seed not sprayed with sulphuric. *Turnips*—16 tons per acre, slightly better than last year; quality also better; brairded satisfactorily and only one sowing necessary; great difficulty experienced in getting the crop singled and weeded; weeds were prevalent all season. *Insects*—Oats were severely damaged by more extensive attacks than usual of grub and wireworm. *Weeds*—Root crops generally suffered from annual weeds due to shortage of labour and continuous broken weather; couch-grass more widespread owing largely to war conditions. *Pastures*—Under average in growth and quality, and at no period abundant. *Live Stock*—Did not do so well as in 1943, as weather was wet and cold. Disease among cattle and sheep still widespread, and cures urgently needed for mastitis and sterility. *Clip of Wool*—Of average quality and over average weight.

BUTE. *Wheat*—None grown. *Barley*—None grown. *Oats*—Very good crop; record tonnage of seed oats exported to mainland. *Harvest*—Weather very showery but crop secured in good condition. *Hay*—Fairly good crop, got in good condition; about 2 tons per acre. *Meadow Hay*—Practically none grown. *Potatoes*—Earlies about 12 tons, lates about 8 tons per acre; a little blight commenced about beginning of August. *Turnips*—Very good crop, about 20 tons per acre; good braird; very

little resowing. *Insects*—A few acres of oats affected by grub. *Weeds*—Not so difficult to handle in green crop as last year. *Pastures*—Up to the average: not as much wild white clover as in some years. *Live Stock*—Did very well in the first half of summer, but were not so good later owing to excessive rainfall. Cattle and sheep affected with worms in some districts. *Clip of Wool*—Up to the usual standard.

ARRAN. *Wheat*—None grown. *Barley*—None grown. *Oats*—Very good crops, but much damage done by bad weather, and some fields completely lost; yield much lower than previous years; seed sown, 5 to 6 bushels per acre. *Hay*—A good crop and well secured, in most places up to $2\frac{1}{2}$ to 3 tons per acre. *Meadow Hay*—Rather light. *Potatoes*—Crops 2 tons less per acre, but excellent samples have been sold for seed; one new variety, "Arran Viking," has been outstanding at trial station. *Turnips*—Crops very variable. *Weeds*—Very troublesome owing to wet season. *Pastures*—Quite good. *Live Stock*—Did well, and were in much demand owing to the fact that practically the whole island stock passed the T.T. test. *Clip of Wool*—About the average in quality and quantity.

LANARKSHIRE (Upper Ward). *Wheat*—From the few acres grown not much was suitable for milling. *Barley*—None grown. *Oats*—50 to 70 bushels per acre; seed sown, 5 to 6 bushels per acre; quality, both oats and straw, very bad. *Harvest*—Started usual time, but was long in being secured owing to very bad weather and scarcity of labour; most of the crop in bad condition. *Hay*— $1\frac{1}{2}$ to 3 tons per acre; a good crop fairly well secured; average quality. *Meadow Hay*—Much the same as in previous year. *Potatoes*—4 to 7 tons per acre; much less than last year; lifted under worst possible conditions; several acres not lifted; more disease than usual. *Turnips*—Fair crop; braided well, but secured in bad condition owing to frost. *Insects*—No injury reported. *Weeds*—Worse than usual owing to wet weather and scarcity of labour. *Pastures*—Average growth. *Live Stock*—Did quite well. Cattle and sheep were free from disease. *Clip of Wool*—Average quality.

LANARKSHIRE (Middle and Lower Wards). *Wheat*—Grain, 20 cwt. per acre; straw, 25 cwt. per acre; quality poor; seed sown, 4 to $5\frac{1}{2}$ bushels per acre. *Barley*—Very little grown. *Oats*—Grain, 20 cwt. per acre; straw, 24 cwt. per acre; mostly saved in partly damaged condition; seed sown, 5 to 6 bushels per acre. *Harvest*—Later than usual in commencing; very protracted by bad weather; one of the worst harvests for many years; very little was secured undamaged. *Hay*—40 cwt. per acre; rather less than last year; quality not so good. *Meadow Hay*—Very little grown; crop lighter and poorer than the year before. *Potatoes*— $6\frac{1}{2}$ tons per acre; not much disease; popularity of Redskin tended to increase. *Turnips*—20 tons per acre; braided well; very little second sowing. *Insects*—Very little damage reported; less than usual. *Weeds*—Some trouble with spurrey and day-nettle; annual weeds caused damage to green crop owing to showery weather. *Pastures*—Fairly good, but too much rain fell in latter part of season for colder lands. *Live Stock*—Did moderately; lambs on foggage and aftermath did not do as well as usual owing to overmuch rain. Cattle and sheep were generally free from disease, apart from diseases of dairy cattle. *Clip of Wool*—Just under average.

RENFREWSHIRE. *Wheat*—Average crop on suitable land, 27 to 32 cwt. per acre; seed sown, 3 to 4 bushels per acre. *Barley*—None grown. *Oats*—An average crop, 25 to 30 cwt. per acre; straw rather less, about 23 to 27 cwt. per acre; seed sown, 5 to 6 bushels per acre. *Harvest*—Early;

commenced about 8th August, a week earlier than last year, and finished about 20th September; weather for the third year in succession very broken, but, despite that, the bulk harvested in good to fair order; later districts suffered most. *Hay*—Light crop, and damaged by weather; $1\frac{1}{2}$ to 2 tons per acre. *Meadow Hay*—Not much grown; secured in good weather at end of July and beginning of August; about 25 cwt. per acre. *Potatoes*—Variable crop; Kerr's Pink, 7 to 12 tons per acre; Golden Wonder and British Queens also varied owing to intensive cropping, and in some cases eelworm; disease not prevalent; no new varieties extensively grown. *Turnips*—Indifferent crop; slow to braird and come to the hoe, and dirtier than usual; 15 to 20 tons per acre; no second sowings reported. *Insects*—Not troublesome. *Weeds*—Very prevalent due to same causes as last year—wet weather, shortage of labour, and also extensive cropping. *Pastures*—Grazed well until the end of year, where not overstocked; in arable districts now mostly under rotation grasses. *Live Stock*—Throve well and there was no disease, apart from odd cases of mastitis. *Clip of Wool*—Average for quality and quantity.

ARGYLLSHIRE (Lochgilphead). *Wheat*—Practically none grown. *Barley*—Very little grown. *Oats*—A good crop, and secured in good order; grain, 30 to 36 bushels per acre; straw, 20 cwt. per acre; seed sown, 5 to 6 bushels per acre. *Harvest*—Started a week earlier than usual, and finished in good time. *Hay*—A lighter crop than last year, 20 to 25 cwt. per acre; about 50 per cent of it was got in good order; the remainder was more or less damaged by rain. *Meadow Hay*—About the same as in previous years. *Potatoes*—Better than last year, and some good crops were grown; average about 5 or 6 tons per acre; no disease; wet weather caused difficulty and delay in lifting. *Turnips*—20 to 25 tons per acre; braided well, with no resowing; quality variable; "Raas" disease was more prevalent. *Insects*—No injury to any extent. *Weeds*—Annuals were conspicuous as usual, but no serious damage was apparent. *Pastures*—Up to previous year's average. *Live Stock*—Cattle did well, but lambs were short of condition. Cattle and sheep generally free from disease. *Clip of Wool*—Below average.

ARGYLLSHIRE (Kintyre). *Wheat*—Very small acreage grown; grain averaged 25 cwt. per acre; seed sown, $3\frac{1}{2}$ bushels per acre. *Barley*—Crops up to average; 18 to 20 cwt. per acre; quality of grain and straw good; seed sown, approximately, 4 bushels per acre. *Oats*—Acreage grown similar to that of 1943; yields of grain and straw below average; average yield of grain, 14 cwt. per acre, with a district range of 12 to 25 cwt.; yield of straw 23 to 28 cwt. per acre; seed sown, 5 bushels per acre. *Harvest*—Commenced second week in August and carried through in good time under favourable conditions; crops secured, with few exceptions, in good condition. *Hay*—Yield good, averaging 30 to 32 cwt. per acre; mostly secured in good order. *Meadow Hay*—Average crop. *Potatoes*—Yield of earlies, 5 to $5\frac{1}{2}$ tons per acre; main crop below average, 5 to 6 tons per acre; several lots had not been lifted by the end of the year due to prolonged period of wet weather; blight fairly prevalent; appeared in second week of July; some spraying carried out. *Turnips*—Weight of crop above that of previous year; average yield, 18 to 20 tons per acre; quality fairly good; braided well; one sowing only. *Insects*—Grub damage to oats very serious, and many crops of lea oats were severely thinned; one of the worst attacks experienced for a considerable time; difficulty experienced in obtaining supplies of Parish Green for treatment. *Weeds*—Control of weeds still a problem owing to shortage of labour; damage above average; some sulphuric acid spraying was carried out to

control charlock. *Pastures*—Growth up to average and well maintained to end of season. *Live Stock*—Did well throughout the season. No serious disease reported among cattle and sheep; very satisfactory progress made in attestation of dairy herds. *Clip of Wool*—Average.

ARGYLLSHIRE (Islands of Islay, Jura, and Colonsay). *Wheat*—Not grown. *Barley*—Not grown. *Oats*—A very good crop, averaging 43 bushels per acre (41 lb. per bushel); straw of very good quality; seed sown, 5 to 6 bushels per acre. *Harvest*—Began about 14th August and completed 30th September; except for a few late sowings harvest weather was exceptionally good, and practically all the crop was binder-cut; considerable use made of Government's tractor service. *Hay*—Heavier than previous year; ryegrass, about 26 cwt. per acre; clover, about 34 cwt. per acre. *Meadow Hay*—More productive than last year. *Potatoes*—Similar to last year, at 8 tons per acre; disease was not prevalent, but weather made lifting difficult, and some crops suffered from wet ground; no departure from usual varieties. *Turnips*—Again yielded about 16 tons per acre; roots did well, but did not make the usual bulk; the crop braided well; second sowings not necessary. *Insects*—Damage was negligible. *Weeds*—The crop kept them under control, and little damage was caused. *Pastures*—Again good and very similar to 1943. *Live Stock*—Generally did well, and lambs grew somewhat more quickly than usual, due to favourable weather in summer. There was some loss in cattle from red-water fever, but stock generally kept free from disease; maggots in sheep gave the usual trouble on sheltered ground. *Clip of Wool*—About average in quantity and quality.

STIRLING DISTRICT.

DUMBARTONSHIRE (Upper). *Wheat*—Very good; secured in fair condition; about 35 to 40 bushels per acre; straw, 35 cwt. per acre; seed sown, 3 to 4 bushels per acre. *Barley*—None grown. *Oats*—Average to light; secured under very difficult conditions; large proportion ruined in the stook; 35 bushels per acre; seed sown, 4 to 5 bushels per acre. *Harvest*—Started about the usual time, but was much protracted later by very bad weather; some of it secured in fair condition, but a large part ruined altogether. *Hay*—Reasonably good; about 25 cwt. per acre. *Meadow Hay*—Very little secured. *Potatoes*—About 6 tons per acre; disease very prevalent from second week of August; certain varieties very bad when lifted. *Turnips*—Best for many years; 25 tons per acre; braided well; very little resowing. *Insects*—Grub the worst pest of the season; on many farms even grass disappeared. *Weeds*—Bad on certain farms owing to wet season and lack of labour. *Pastures*—Very poor in early part of season, and never recovered, so that milk supply was poor all summer. *Live Stock*—Young stock did fairly well in latter part of season. Cattle and sheep were generally free from disease. *Clip of Wool*—Of average quality, and a little over average in quantity.

DUMBARTONSHIRE (Lower). *Wheat*—Sown under good conditions and braided well; some fields suffered from attack by grub in spring; about 46 bushels per acre (59 lb. per bushel); straw, about 30 cwt. per acre; seed sown, $3\frac{1}{2}$ bushels per acre; quality of grain and straw good. *Barley*—Very little grown. *Oats*—Suffered from leather-jacket grub in early spring, but recovered to be a splendid crop by harvest-time; 52 bushels per acre, weighing 40 lb. per bushel; straw, 25 cwt. per acre; seed sown, $5\frac{1}{2}$ bushels per acre. *Harvest*—Started about the usual time, but abnormally

wet weather with storms of wind made harvesting one of the most disastrous ever experienced, a large proportion of the crop being badly damaged. *Hay*—Rather lighter than last year; about 38 cwt. per acre; quality very variable, and clover rather deficient. *Meadow Hay*—Better than in 1943. *Potatoes*—No so bulky as last year, just under 6 tons per acre; disease made its appearance in middle September and damaged second-early crops; no new varieties planted. *Turnips*—Bulkier and of better quality than in previous year, about 16½ tons per acre; braided well except where grub necessitated second sowing. *Insects*—Leather-jacket grub very troublesome during spring, and attacked almost all crops, causing greater damage than usual. *Weeds*—Turnips suffered from annual weeds, the most troublesome being the redshank. *Pastures*—Grazing was very poor during the whole of the season both in quantity and quality. *Live Stock*—Made only fair progress during the season. Cattle and sheep were fairly free from disease, except that mastitis was prevalent among dairy cattle. *Clip of Wool*—Not so heavy as in 1943; quality very good.

STIRLINGSHIRE (West). *Wheat*—Not much grown; quality fairly good; 17 cwt. per acre; seed sown, 4 bushels per acre. *Barley*—None grown. *Oats*—Crop above average, but much of it lost; quality at threshing poor; any successfully secured crops well above average, but lots of grain lost by shedding; weather spoiled quality of grain and straw; growing yield, estimated 20 cwt., reduced at threshing to 15 cwt. per acre; seed sown, 5 bushels per acre. *Harvest*—Started at usual time; bad weather protracted work, and crop was secured in bad order; some threshed out of stook to save the grain reduced the quality of the straw. *Hay*—Quality bad, caused by being too mature when cut; weather prevented cutting for three weeks and also spoiled much of it; 30 cwt. per acre. *Meadow Hay*—Quality poor; below average. *Potatoes*—5½ tons per acre; blight not serious; poverty of yields due to late planting and lack of sunshine. *Turnips*—average, 25 tons per acre; good braided; no resowing. *Insects*—No damage reported. *Weeds*—Worse than ever, principal damage from persicaria; weather prevented cultivations and cleaning. *Pastures*—Below average in yield and quality. *Live Stock*—Did very well. Cattle and sheep more free from disease than usual; mastitis and udder clap still present; lambing sickness and pregnancy toxæmia prevalent in sheep. *Clip of Wool*—Over average and quality good.

STIRLINGSHIRE (East). *Wheat*—Some heavy crops, but much of it laid and quality not so good as last year; some inclined to sprout; 40 to 50 bushels per acre; straw, 25 cwt. per acre; seed sown, 4 bushels per acre. *Barley*—Variable returns; some very heavy and twisted, but threshed out wonderfully; sample quite fair; 45 bushels per acre; straw, 20 to 25 cwt. per acre; seed sown, 3½ bushels per acre. *Oats*—Very good crops, but disappointing weather spoiled what might have been a record harvest; only a few farmers finished without waste; 40 to 50 bushels per acre; straw, 20 cwt. per acre; seed sown, 6 to 7 bushels per acre. *Harvest*—Started about the middle of August, but owing to bad weather was long and tedious with much grain wasted, and on some farms not all secured. *Hay*—Cutting started a week later than last year, and farmers who secured it in the latter part of July had excellent quality; ryegrass, 30 cwt. per acre; timothy, 3 to 4 tons per acre. *Meadow Hay*—A fair crop, but quality poor; 20 to 30 cwt. per acre. *Potatoes*—Crops varied according to variety and district; tubers not up to last year's size on many farms; 5 to 9 tons per acre; scarcely any disease; some lots were never lifted; no new varieties grown. *Turnips*—Crop much better than

in 1943; braided well; no resowing; a little finger-and-toe disease; 25 to 30 tons per acre. *Insects*—All crops free of pests, except a few fields of timothy hay, which were attacked by a green insect in June and utterly destroyed. *Weeds*—Very prevalent, the redshank type especially, amongst the green crop, and were difficult to overcome, but not much damage caused. *Pastures*—Came away early, with good growth and quality, but were spoiled by a wet and sunless summer. *Live Stock*—Cattle did well where pasture was not overstocked; many cases of udder-clap reported during the month of August; otherwise no disease. *Clip of Wool*—Fair quality; about average in quantity.

CLACKMANNANSHIRE. *Wheat*—Where sown early braided was good, and crop did well; much that was sown late had to be oversown with barley or oats owing to wheat-bulb fly and leather-jacket grub; 35 to 48 bushels per acre; 60 bushels per acre claimed for Alls wheat; straw, 25 to 30 cwt. per acre; seed sown, 4 bushels per acre. *Barley*—Very good crop; 45 to 56 bushels per acre; straw, 20 to 25 cwt. per acre; seed sown, 3 to 4 bushels per acre. *Oats*—Braided well; some of the thick-skinned varieties badly laid owing to wet season, but quality surprisingly good; 48 to 56 bushels per acre; 80 bushels per acre claimed by some growers for newer varieties; straw, 25 to 30 cwt. per acre; seed sown, 4 to 6 bushels per acre according to variety. *Harvest*—Began about the usual time and was in some cases long and tedious owing to bad weather. *Hay*—Clover hay, with 35 to 40 cwt. per acre, was lighter; timothy, with up to 4 tons per acre, much the same as in 1943. *Meadow Hay*—There was little meadow hay grown. *Potatoes*—Kerr's Pink, 6 to 7 tons per acre; Golden Wonder, 4 to 6 tons per acre; both produced more tubers of seed size; Redskin, 10 to 11 tons per acre; no disease reported; with help from school children all the potatoes were secured. *Turnips*—Braided well; good crop, 20 to 25 tons per acre; no second sowing reported; some fields suffered from lack of second hoeing owing to labour shortage. *Insects*—Leather-jacket grub affected lea oats and wheat; damage greater than last year. *Weeds*—Redshank, chickweed, day-nettle, and runch caused some loss to turnips and further polluted the land not reseeded; damage greater than usual. *Pastures*—Grass slow in coming; feeding value lowered because of almost continuous cold and wet weather. *Live Stock*—Grazed well in spite of wet weather. Cattle and sheep were free from disease. *Clip of Wool*—Quantity above average; quality hardly so good as previous season.

PERTH DISTRICT.

PERTHSHIRE (Central). *Wheat*—Slightly less grown; sowing very difficult owing to wet weather; poorer than usual; 26 to 44 bushels per acre; straw, 20 to 30 cwt. per acre; seed sown, 4 bushels per acre. *Barley*—More grown than usual; crop good in most cases; 26 to 56 bushels per acre; straw, 15 to 20 cwt. per acre; seed sown, 3 to 3½ bushels per acre. *Oats*—Good acreage grown; grain fair, but less than previous seasons; 32 to 58 bushels per acre; straw, 15 to 24 cwt. per acre; seed sown, from 5 to 7 bushels per acre. *Harvest*—Started about usual time; very broken weather, although on the whole rather easier in this district than last year; crop mostly secured in fair condition. *Hay*—An average crop, with plenty of clover in most cases; some secured in good condition, some badly wasted, as good weather was very limited; 1 to 2 tons per acre. *Meadow Hay*—Good crop, secured in fair condition. *Potatoes*—Crop poor, in some cases not dressing out much more than the seeding;

3 to 8 tons per acre; earlies badly diseased; crop in general cut down by blight. *Turnips*—Good average crop where weeds were kept down; this was difficult owing to wet weather; swedes, 24 to 30 tons per acre; yellows, 18 to 24 tons per acre. *Insects*—More damage than usual to grain crop by leather-jacket grub and wireworms. *Weeds*—Bad season, as wet weather prevented working crops properly; day-nettle, charlock, and reishank troublesome. *Pastures*—Fairly good, but owing to their short duration had not the stock-carrying capacity of pre-war times. *Live Stock*—Did well. Cattle and sheep free from disease. *Clip of Wool*—A good average, and of good quality.

FIFESHIRE (Middle and Eastern). *Wheat*—Almost as much as last year; 32 to 40 bushels per acre; straw, about the same as last year. *Barley*—Good crop; quality spoilt in some cases through bad weather; 40 to 52 bushels per acre. *Oats*—Very heavy crop; quality spoilt somewhat through bad weather in harvest; from 48 to 72 bushels per acre. *Harvest*—Started at usual time, but was delayed through bad weather; crop got in early was quite good, but late crops were rather spoilt. *Hay*—Good; 2 to 3 tons per acre; secured in good weather. *Meadow Hay*—None grown. *Potatoes*—6 to 8 tons per acre; about 2 tons per acre less than last season; slightly affected by blight. *Turnips*—25 to 30 tons per acre; good and sound crop; braided well; very little resowing. *Insects*—Not specially troublesome. *Weeds*—Not exceptionally injurious. *Pastures*—Were of average growth and quality. *Live Stock*—Did well. Cattle and sheep were generally free from disease. *Clip of Wool*—Average in both quality and quantity.

FIFESHIRE (Western). *Wheat*—Large acreage sown, some under adverse conditions; braided well; average, 36 to 40 bushels per acre; damage by rust appreciably less than last year; seed sown, 4 bushels per acre; several areas of spring wheat grown, including varieties Diamond 11 and Atle, appeared to have done well; weight of straw and grain about equal. *Barley*—Large area sown; braided well; owing to wet weather crops badly laid early in the season, and much was unharvested; secured crops often yielded poor samples of badly filled grain; return below average, 32 to 40 bushels per acre; seed sown, 2 to 4 bushels per acre. *Oats*—Acreage sown similar to previous year; crops generally heavy and badly laid; 40 to 48 bushels per acre; quality of grain poor, very few samples reaching seed or milling standard; seed sown, 5 to 7 bushels per acre. *Harvest*—Started middle of August, and was one of the worst on record, the weather being unfavourable throughout; many barley, oat, and bean crops unharvested or badly wasted. *Hay*—Average quality, but bad weather at beginning of season affected quality, most noticeably in early districts; 35 cwt. per acre. *Meadow Hay*—Average crop, but not well got. *Potatoes*—Below average, 4 to 6 tons per acre; reduction caused by lack of sun, blight, and early frosts; of new varieties grown, Home Guard, Vanguard, and Ulster varieties generally were successful; owing to wet weather gathering considerably prolonged, and lifting was incomplete on many farms. *Turnips*—16 to 18 tons per acre; mostly sound; some resowing owing to fly and slug attack; late grain and potato harvests interfered with storing. *Insects*—Damage generally less than last year; wireworm and grub prevalent in some areas. *Weeds*—Owing to wet weather and shortage of labour, destruction of annuals in green crops difficult to carry out; practice of spraying grain crops was more general. *Pastures*—Growth above average, and continued throughout the season. *Live Stock*—In spite of abundance of grass, stock did not thrive up to expectations, probably due to cold wet weather; several outbreaks of foot-and-mouth

disease severely disorganised movement of stock; incidence of grass sickness probably less than in previous years. *Clip of Wool*—Above average, quality good.

PERTSHIRE (Eastern). *Wheat*—Winter wheat good, but yield not so good as last year; 30 to 40 bushels per acre; seed sown, 4 to 5 bushels per acre; some English seed used, 3 to 4 bushels per acre; samples fairly good, especially where early harvested. *Barley*—Good, from well-farmed land; seed sown, 3 to 3½ bushels per acre; samples decidedly better than last year. *Oats*—A good crop, but a little disappointing; owing to the sunless summer bushel weight deficient in most cases; seed sown, 4 to 6 bushels per acre; samples on early farms very good, the great bulk being sold for seed at very remunerative prices. *Harvest*—Started about the usual time, early August, and was good for about three weeks, but afterwards rather broken; on the whole better than last year. *Hay*—Light, about 40 cwt. per acre; not so good as last year; mostly ryegrass grown, quality being the poorest for a long time; a good proportion spoiled in the making, as it rained ceaselessly for three weeks. *Meadow Hay*—An average crop, secured in fair condition. *Potatoes*—Below average, fully 2 tons per acre less than last year; 6 to 8 tons per acre; some disease; tubers did not keep very well owing to mild, wet weather; very few new varieties grown. *Turnips*—A good average; 25 to 30 tons per acre; braided very well; practically no resowing. *Insects*—No damage reported. *Weeds*—Caused no injury, but crops not well cleaned owing to labour scarcity and cross cropping under Government requirements. *Pastures*—Grass came away well and gave a good grazing season. *Live Stock*—Throve very well; a few cases of trouble with half-bred ewes before lambing. Cattle and sheep were generally free from disease. *Clip of Wool*—Above average; quality good.

PERTSHIRE (Western). *Wheat*—Acreage similar to last year; crops patchy; many fields resown in spring; yield not up to average, 30 to 35 bushels per acre; straw, 15 to 25 cwt. per acre; seed sown, 4 bushels per acre. *Barley*—More sown than last year; a greater percentage secured compared with previous year; seed sown, 3 to 4 bushels per acre. *Oats*—Good crop, 40 to 50 bushels per acre, with new varieties higher; straw good; seed sown, 5 to 7 bushels per acre. *Harvest*—Began about usual time, middle of August; mostly secured in fair order; weather more favourable than in most other parts of Scotland. *Hay*—Timothy, good; 70 to 90 cwt. per acre; green cut secured in good order; more seeded than last year; 3 to 5 cwt. of seed per acre; ryegrass, average; 20 to 30 cwt. per acre driffield, 50 to 60 cwt. per acre carse. *Meadow Hay*—Average crop, not easily secured. *Potatoes*—Poor; 5 to 7 tons per acre; more disease than last year; many fields lifted in wet condition. *Turnips*—Better than average; quality good; 30 to 35 tons per acre; braird good; few resowings. *Insects*—Not much damage caused. *Weeds*—Not so bad as usual. *Pastures*—Up to average. *Live Stock*—Did well; sheep and cattle free from disease. *Clip of Wool*—Above average and of good quality.

PERTSHIRE (Highland). *Wheat*—Not generally sown; only a few acres on favoured farms. *Barley*—In most cases fair, but badly laid on some farms; about 40 bushels per acre; seed sown, 4 bushels per acre. *Oats*—Increased acreage again sown; crop, average; natural weight of grain about 42 lb. per bushel; seed sown, 6 bushels per acre. *Harvest*—Began in the middle of August, but, owing to weather conditions, was not finally completed until the first week of October; where laid, grain and straw were inferior in quality. *Hay*—Average and of good quality;

35 cwt. per acre ; well secured. *Meadow Hay*—Not much grown ; average crop. *Potatoes*—Average about 6 tons per acre ; substantially lower by 2 to 3 tons per acre on most farms ; blight in evidence in certain varieties ; crop generally secured under favourable conditions, notwithstanding shortage of labour ; no new varieties grown. *Turnips*—Average 20 tons per acre ; braided well ; no second sowing required. *Insects*—No damage recorded. *Weeds*—More in evidence than in former years, and somewhat difficult to control owing to prevailing weather during summer. *Pastures*—An average grazing season. *Live Stock*—Throve fairly well ; cattle and sheep free from disease ; a few isolated cases of grass sickness amongst horses. *Clip of Wool*—Good quality, and about an average crop.

ABERDEEN DISTRICT.

ANGUS (Western). *Wheat*—38 bushels per acre ; straw, fair ; grain varied according to harvest ; seed sown, 3 to 4 bushels per acre. *Barley*—45 bushels per acre ; lots destroyed by bad weather ; seed sown, 3 to 4 bushels per acre. *Oats*—52 bushels per acre ; very much under weight per bushel although appearance good ; straw only fair quality, owing to weather conditions ; seed sown, 5 to 6 bushels per acre, drilled. *Harvest*—Started usual time, second week of August ; badly held up by weather ; mostly not in good condition. *Hay*—30 cwt. per acre ; quality mostly good ; ryegrass good ; clover did not do so well ; weather for making, fair. *Meadow Hay*—None grown. *Potatoes*—Yield less than last year ; probably about 5 tons per acre ; disease appeared to a certain extent, and many of the crops were burnt ; no new varieties ; some acres not lifted because of frost. *Turnips*—Mostly sound ; 22 tons per acre ; good braided ; no resowing reported. *Insects*—No damage reported. *Weeds*—Very little trouble ; not more than usual. *Pastures*—Up to last year's standard. *Live Stock*—Throve very well. Cattle and sheep generally were free from disease. *Clip of Wool*—Good ; over average.

ANGUS (Eastern). *Wheat*—Quite a good crop ; 40 to 48 bushels per acre, but owing to wet weather lacked the usual bloom ; straw abundant, but more brittle than usual ; seed sown, about 4 bushels per acre. *Barley*—Too heavy in most cases ; straw went down badly ; much of the crop was got in good condition, but did not thresh well, though some was worth top price ; return, 56 bushels per acre ; seed sown, about 3½ bushels per acre. *Oats*—On poor land very light in weight ; 36 to 38 lb. per bushel ; but on the really good land near the coast crops were good ; 80 to 88 bushels per acre (42 to 44 lb. per bushel) ; straw very abundant, but quality only fair ; best oats in very good demand for seed ; seed sown, 4 to 6 bushels per acre according to variety. *Harvest*—Began about a week later than usual owing to constant rain during August, and took six to eight weeks to finish owing to wet and scarcity of labour, which was very poor and costly ; much of the crop was secured in bad condition and straw discoloured, but much of the grain good for weight and colour. *Hay*—If cut early was secured in good order ; very well mixed with clover ; weight quite as good as last year on best land ; 3 to 3½ tons per acre ; the later-cut hay a bit spoiled by weather. *Meadow Hay*—None made. *Potatoes*—Crop generally 3 to 4 tons per acre under average ; blight began in end of August, but most varieties did not suffer more harm than usual ; 7 to 8 tons per acre ; seed and ware about the average return ; no new varieties calling for special note ; Home Guard probably the most promising. *Turnips*—The heaviest crop for many years ; 25 to 35 tons per acre ;

braided well; no second sowing needed; a little finger-and-toe where land was wet and sour and badly handled. *Insects*—Practically no damage caused. *Weeds*—Grew very fast, and through want of labour in many cases permitted damage to the crops, but where labour was available injury was averted. *Pastures*—Very good and abundant all season. *Live Stock*—Throve well all the season; no disease of any kind reported. *Clip of Wool*—Quite good; about average.

KINCARDINESHIRE. *Wheat*—31 bushels per acre; grain and straw not up to average quality; seed sown, 3 to 4 bushels per acre, drilled. *Barley*—36 bushels per acre; grain and straw not up to average quality; seed sown, 3 to 4 bushels per acre, drilled. *Oats*—50 bushels per acre; grain and straw 60 per cent good quality, 40 per cent soft; seed sown, 4 to 8 bushels per acre. *Harvest*—Started about 28th August, and in many of the later districts was not completed by the middle of October; secured in good condition in early districts, but in later districts much of it was in very bad condition. *Hay*—A good crop; 2 tons per acre; was secured in good condition. *Meadow Hay*—None grown. *Potatoes*—Not good; 5½ tons per acre; no disease. *Turnips*—16 tons per acre; quality good; braided very well; only one sowing required. *Insects*—No damage reported. *Weeds*—No injury done. *Pastures*—Above average growth, and kept green all through the season. *Live Stock*—Throve very well to begin with, but later did not keep their condition so well. Cattle and sheep generally were free from disease. *Clip of Wool*—Average.

ABERDEENSHIRE (Buchan). *Wheat*—Not many acres grown; good to fair crop of about 32 bushels per acre; seed sown, 2 to 3 bushels per acre. *Barley*—Average, 32 to 40 bushels per acre; quality good where early harvested; seed sown, 3 bushels per acre. *Oats*—Plenty straw, but poor return of grain compared with 1943, except where grown near the coast; crops early got yielded from 32 to 64 bushels per acre; seed sown, 5 to 7 bushels per acre. *Harvest*—Most difficult to secure for a long time, lasting from four to ten weeks owing to bad weather. *Hay*—Good crop, but, like the corn harvest, was difficult to secure in good order; 30 to 40 cwt. per acre. *Meadow Hay*—None grown. *Potatoes*—2 to 4 tons less per acre than in the previous year; some disease, and badly harvested from weather difficulties. *Turnips*—Quite a good crop, from 10 to 20 tons per acre; braided well. *Insects*—Not much damage caused. *Weeds*—Damage greater than last year, as is usual in a wet season. *Pastures*—Growth above average, but quality poor compared with previous season. *Live Stock*—Did fairly well. Cattle and sheep were generally free from disease. *Clip of Wool*—Average in weight and quality.

ABERDEENSHIRE (Central). *Wheat*—Average, 26 bushels per acre; quality poor. *Barley*—Average, 32 bushels per acre. *Oats*—Average, 36 bushels per acre. *Harvest*—Late, delayed by bad weather; secured only in fair condition as a whole, and some bad. *Hay*—Slightly less than last year; clover, 23 cwt. per acre; ryegrass, 17½ cwt. per acre. *Meadow Hay*—Rather smaller crop than last year; average, 18 cwt. per acre. *Potatoes*—Average, 4½ tons per acre. *Turnips*—Average, 10 tons per acre. *Insects*—Not much damage; less than usual. *Weeds*—Some damage caused by surface weeds; injury greater than usual. *Pastures*—Less than average growth and quality. *Live Stock*—Below average standard. Cattle and sheep were free from disease. *Clip of Wool*—Below average.

ABERDEENSHIRE (Strathbogie). *Wheat*—None grown. *Barley*—Quantity grown above average and crops fair; from 32 to 40 bushels

per acre (52 to 55 lb. to the bushel); seed sown, 4 bushels per acre. *Oats*—Crop heavier than in 1943, but not so good; very badly harvested and yield was below average, the weather being most unfavourable; 38 to 42 bushels per acre (38 to 41 lb. per bushel). *Harvest*—Worst weather on record; crops very badly secured; there was a fair quantity of straw of poor quality; shortage of labour made harvesting more difficult, and some crops were still lying in the fields at the end of the year. *Hay*—Not much grown. *Meadow Hay*—None grown. *Potatoes*—Quality fair; quantity grown much below average; no new varieties. *Turnips*—Crops quite satisfactory; no resowing necessary. *Insects*—No trouble with pests. *Weeds*—Gave little or no trouble, as weather was favourable for cleaning the land. *Pastures*—Below average, and did not last throughout the autumn. *Live Stock*—The rearing of feeding cattle showed tendency to give way to milk production. Cattle and sheep generally were free from disease. *Clip of Wool*—Quality good; quantity a little above average.

BANFFSHIRE (Lower). *Wheat*—None grown. *Barley*—A poor crop, badly harvested; yield about 16 cwt. per acre; 52 to 54 lb. per bushel; seed sown, 4 bushels per acre. *Oats*—A fair crop but badly harvested; much grain left in fields owing to crop being badly laid; about 40 to 45 bushels per acre; straw of poor quality; seed sown, 6 to 7 bushels per acre. *Harvest*—Started on 18th August and continued well into November owing to continued wet weather; some small areas were still to harvest at the end of the year; 50 per cent of the crop only secured in fair condition. *Hay*—An average crop secured in good condition; 30 to 40 cwt. per acre; crop well mixed as regards ryegrass and clovers. *Meadow Hay*—None grown. *Potatoes*—Yield less than last year; 4 to 5 tons per acre; disease reported on many farms commencing about end of July; the crop on some farms was not lifted till beginning of 1945. *Turnips*—Slightly below average; about 14 to 16 tons per acre; braided well; no second sowing. *Insects*—No damage caused. *Weeds*—Much knot-grass, yarr, and couch-grass appeared in all crops; damage greater than last year. *Pastures*—As good as in 1943. *Live Stock*—Sheep thrive well throughout the grazing season, but cattle did not do well during the later months owing to the cold wet weather. Cattle and sheep were generally free from disease; the wet season caused some footrot among sheep. *Clip of Wool*—Average in quality and quantity.

BANFFSHIRE (Upper). *Wheat*—None grown. *Barley*—Returns slightly lower than last year in most districts, and not quite standard weight from lack of sunshine; average, 30 to 35 bushels per acre; seed sown, 4 to 5 bushels per acre. *Oats*—Good average crop generally, some fields exceptionally good; average, 35 to 50 bushels per acre; where secured in good time weight was standard or a few pounds over; seed sown, 5 to 8 bushels per acre. *Harvest*—Started about usual time, but weather was bad throughout, and it took nine to twelve weeks to get it all in; some not in too good condition. *Hay*—Good average crop, in some districts better than last year; 2 to 3 tons per acre; quality good. *Meadow Hay*—None grown. *Potatoes*—In some districts yield was lower than last year's, in others fully maintained; average, 3 to 6 tons per acre; not much disease, but considerable quantity lost through frost. *Turnips*—Good crop generally; 16 to 20 tons per acre; quality good; no difficulty in braiding; no second sowing. *Insects*—No damage worth reporting. *Weeds*—Some fields affected, principally on account of extra breaking up of lea; knot-grass and stringy gave most trouble. *Pastures*—Rain during summer

helped grazing, and in most cases results were better than last year. *Live Stock*—Did well on pastures and no disease reported anywhere, with the exception of grass sickness amongst horses, which was severe in some districts. *Clip of Wool*—About average return and quality good.

INVERNESS DISTRICT.

MORAYSHIRE. *Wheat*—A good crop; 45 bushels per acre; not so many reports of "take all" or rust as in the previous year; straw, 35 cwt. per acre; seed sown, usually 4 bushels per acre. *Barley*—Much of the crop badly laid, and consequently small and light; 34 bushels per acre, weighing 52 to 54 lb. per bushel; straw, 22 cwt. per acre, poor quality; seed sown, 2½ to 4 bushels per acre. *Oats*—Fair crop, but rather more light than usual in the earlier districts; in the uplands, owing to bad harvest, it turned out very light. *Harvest*—A little later than usual, and very protracted by weather and shortage of labour. *Hay*—An average crop of good quality generally, about 1½ to 2 tons per acre. *Meadow Hay*—None grown. *Potatoes*—Differed greatly according to variety; King Edward, very poor owing to blight; Majestic, fair; 4 to 5 tons and 8 to 9 tons per acre respectively; no new varieties. *Turnips*—Fair; 22 to 30 tons per acre; quality good; very little second sowing required. *Insects*—No injury recorded. *Weeds*—Not very serious; rather less damage than last year. *Pastures*—Very good; kept up well throughout the season. *Live Stock*—Did very well. Cattle and sheep generally were free from disease. *Clip of Wool*—Good quality; slightly over average in quantity.

NAIRNESHIRE. *Wheat*—Very little grown; about 48 bushels per acre; seed sown about 3½ bushels per acre. *Barley*—36 bushels per acre; seed sown, about 2½ bushels per acre, drilled, and about 3½ bushels, broadcast. *Oats*—About 45 bushels; seed sown, 6 bushels per acre. *Harvest*—Very much delayed by the weather, and much of the crop badly laid and twisted, but most was in good condition. *Hay*—Not quite so good as last year; about 1 ton per acre. *Meadow Hay*—None grown. *Potatoes*—About 5 tons per acre; no disease. *Turnips*—The best crop for several years. *Insects*—No injury recorded. *Weeds*—No injury to report. *Pastures*—Of average growth and quality. *Live Stock*—Throve well. Cattle and sheep free from disease. *Clip of Wool*—About average.

INVERNESS-SHIRE (Skye). *Wheat*—None grown. *Barley*—Virtually none grown. *Oats*—Average yield per acre, 12 cwt. grain, 18 cwt. straw; average quality much about same as in previous year; seed sown, 5 bushels per acre. *Harvest*—Was carried through in about usual time; commenced earlier than usual, but in some districts was protracted on account of adverse weather; crop mainly secured in good condition. *Hay*—Quantity grown about average; quality much above average; 1½ tons per acre. *Meadow Hay*—More productive than last year. *Potatoes*—4 tons 10 cwt. per acre, average yield; very slight incidence of blight, not affecting crop to any great extent, was noticed mid-September; late planting and prolonged drought depressed yield; no new variety recorded. *Turnips*—18 tons per acre average; quality good for this area; generally better than normal; regular braiding. *Insects*—No notable damage. *Weeds*—Annuals more prevalent than usual; charlock thick in potato and turnip crops and in oats. *Pastures*—Grazing was up to average; somewhat later in coming on, but continuing longer into winter than in previous year.

Live Stock—Cattle and sheep both did well on the pastures by the late autumn, but lambs on average were not up to weight or condition of previous year; wedder stock did well. No notable disease in cattle beyond the springtime condition of "dryness," which caused some deaths by a calcium-deficiency disease; the usual sheep diseases and tick infestation were present in about ordinary proportion. *Clip of Wool*—The weight of fleece rather under average, but the quality maintained.

INVERNESS-SHIRE (Lochaber). *Wheat*—None grown. *Barley*—None grown. *Oats*—Average crops secured in very good condition. *Harvest*—Was very good for all who got their crops in fairly early, but a few late crops were rather spoiled. *Hay*—Average, and all secured in good condition; about 2½ tons per acre. *Meadow Hay*—About average; secured early, and much more could have been got, as the season was dry for weeks after hay-making ceased. *Potatoes*—Under average and small in size; no disease; no new varieties observed. *Turnips*—Very few planted or sown, but where sown they were a good healthy crop. *Insects*—There was very little damage by insects, as weather on the whole was cold. *Weeds*—Not much trouble experienced. *Pastures*—Average. *Live Stock*—Rather short of condition owing to want of sunshine. Cattle and sheep generally were free from disease. *Clip of Wool*—Over average.

ROSS-SHIRE (Dingwall and Munlochy). *Wheat*—Larger acreage grown; a good crop; seed sown, 3 to 4 bushels per acre. *Barley*—About the same acreage as last year; a good crop; in most cases very badly lodged; yield very variable. *Oats*—An average crop, but mostly badly laid; large acreage spoiled in the stook owing to bad harvest; where the crop was secured in order it threshed well. *Harvest*—Later than usual, and protracted owing to bad weather and scarcity of labour; a considerable proportion was not secured in good order. *Hay*—Smaller acreage available owing to plough-up; a good crop on good land; up to 2½ tons per acre. *Meadow Hay*—None grown. *Potatoes*—At least 2 tons per acre less than last year; no disease; the crop was largely seed, with a very small proportion of ware. *Turnips*—Above average, and no trouble with resowing. *Insects*—No damage caused. *Weeds*—Annuals got the upper hand owing to labour scarcity; weeds at roadsides and on waste land have not been cut owing to the war emergency, and they are spreading. *Pastures*—Average growth and quality. *Live Stock*—Throve well; cattle and sheep free from disease. *Clip of Wool*—Average.

ROSS-SHIRE (Tain, Cromarty, and Invergordon). *Wheat*—Mixed crop; early sown gave much better results. *Barley*—On good land 40 bushels per acre; on very good, 50 to 60 bushels per acre; not much lodged. *Oats*—On good land 60 to 65 bushels per acre; not much lodged; intensive cropping programme had serious effect on crops and on grass following on. *Harvest*—Early sown crops ready 15th to 20th August; barley ripened well. *Hay*—Fair crop; well secured. *Meadow Hay*—None grown. *Potatoes*—5 to 8 tons per acre; usual well-known varieties; little blight reported. *Turnips*—Early sown did very well; later, not too well. *Insects*—Not much damage generally done. *Weeds*—On the increase owing to labour shortage. *Pastures*—Grazed well. *Live Stock*—Healthy on the whole; cattle and sheep generally were free from disease. *Clip of Wool*—Good.

CAITHNESS-SHIRE. *Wheat*—Only a small acreage grown; crops not quite so good in quality as last year; average, 36 to 40 bushels per acre; seed sown, 4 bushels per acre. *Barley*—Less productive than last year; about 28 to 32 bushels per acre; quality impaired by excessive rain;

seed sown, 4 bushels per acre. *Oats*—Good crop, but extensively damaged by unfavourable weather; grain and straw poor quality; part of the crop remained in fields unsecured; 32 to 36 bushels per acre; seed sown, 4 to 6 bushels per acre. *Harvest*—Began about a fortnight later than last year; cutting was general the second week of September; operations were hampered and unduly protracted by bad weather; some fields were uncut and crop destroyed; where secured, crop was in bad condition and partially damaged. *Hay*—The quantity and quality of the hay crop was similar to last year, both as regards ryegrass and clover; 2 to 3 tons per acre. *Meadow Hay*—An average crop; did not differ much from last year as regards productivity. *Potatoes*—Yield about half that of last year; part of the crop remained in the ground; average about 4 tons per acre; not much evidence of disease; no new varieties planted. *Turnips*—Early sown a good crop, equal to last year; late sown very small; average yield, 20 tons per acre; crop braided well; resowing unnecessary, but a considerable acreage was late in being sown owing to the wetness of the soil. *Insects*—No damage reported. *Weeds*—Some crops somewhat choked and retarded by weeds; excessive wetness of soil made eradication difficult, spurrey, charlock, and thistles being most prevalent; damage rather worse than usual. *Pastures*—Were good, equal to last year. *Live Stock*—Throve well on pasture and made good progress; cattle and sheep generally free from disease; some evidence of scour among lambs. *Clip of Wool*—Average in quality and quantity.

ORKNEY. *Wheat*—None grown. *Barley*—Grain, 30 to 40 bushels per acre; straw, 23 to 30 cwt. per acre; seed sown, 3 to 3½ bushels per acre. *Oats*—Rather less than usual; averaged from 25 to 55 or 60 bushels per acre; straw, similar to that for barley; quality of grain and straw below average on account of difficult harvesting conditions; seed sown, 4 to 8 bushels per acre according to variety. *Harvest*—Operations started as usual about the first week of September, and in the North Isles some little time earlier; weather good until mid-September, but thereafter rain made operations very difficult; nearly all the crop was secured by the last week of October. *Hay*—Quality about average; harvesting was marred by difficult weather and a proportion of the crop suffered; quantity varied from 25 to 45 cwt. per acre. *Meadow Hay*—Crop of little importance. *Potatoes*—Considerably below average; plentiful supply of tubers, but small; fairly general incidence of blight and the crop suffered considerably; estimated yield varied from 4 to 8 tons per acre. *Turnips*—About average; braided well, and very little resowing was necessary. *Insects*—No significant damage reported. *Weeds*—No very serious damage reported; in some parts yields were undoubtedly reduced by charlock. *Pastures*—Were of average growth and quantity. *Live Stock*—Throve satisfactorily; no instances of disease reported among cattle and sheep. *Clip of Wool*—Quality average.

SHEETLAND. *Wheat*—None grown. *Barley*—Slightly above average; grain, 13 to 14 cwt. per acre; straw, 14 to 15 cwt. per acre; quality of both grain and straw similar to 1943; seed sown, 2 to 3 bushels per acre. *Oats*—Quality of grain exceptionally good, best yield for many years; straw, good average; grain, 10 to 12 cwt. per acre; straw, 16 to 18 cwt. per acre; seed sown, 4 to 6 bushels per acre. *Harvest*—Commenced about the usual time, but with suitable conditions was completed considerably earlier than in most seasons; crop secured in good condition, though heavy rain after stacking has caused some damage in small type of stack built on crofts. *Hay*—15 to 18 cwt. per acre; yield superior to previous

year, and quality still better; excellent weather conditions prevailed during hay-time. *Meadow Hay*—Slightly above average; Quality good, due to good weather during curing. *Potatoes*—4½ to 5 tons per acre; slightly below yield of 1943 crop; no disease; some heavy yielding varieties grown. *Turnips*—Average, 13 tons per acre; little difficulty at brairding time; no second sowing required. *Insects*—Again attacks by grub in oats fairly widespread; attacks by cabbage root-fly scarcely so widespread as last year; turnip root-fly, on lighter soils, appeared to be worse. *Weeds*—Growth of charlock and spurrey not so prevalent in oats. *Pastures*—Grass was very slow in coming, owing to very wet March and April; average growth, however, continued well on in season. *Live Stock*—With good summer, thrive well; cattle and sheep generally were free from disease. *Clip of Wool*—Quality good; yield average.

THE WEATHER OF SCOTLAND IN 1944.

By W. A. HARWOOD, D.Sc., F.R.S.E.

THIS report consists of (1) a general description of the weather from month to month, and (2) a selection of rainfall returns in which each county of Scotland is represented by one or more stations. Temperature readings, unless otherwise stated, are from thermometers exposed in the regulation "Stevenson Screen."

JANUARY.

In the years 1940 to 1942 January was very cold; in 1943 it was nearly normal; and in 1944 it was exceptionally mild—the mildest January for twelve years. As is generally the case, these mild winter conditions accompanied south-westerly weather with dull skies, gales, and, in the west, persistent rainfall. There were gales on 24 days.

The mean temperature for the country as a whole was nearly $1\frac{1}{2}$ degrees above the average, and in some parts the excess was over 3 degrees. There was, however, a spell of sharp frost in the second week. On 6 days during the month, shade temperatures rose above 50° F. in places. The highest reading was 57. This was reached at both Gordon Castle and Stonehaven on the 30th and at Montrose on the 30th and 31st. The cold spell gave fairly low temperatures, especially at high-level stations. Balmoral and Braemar reported 13° F. (19 degrees of frost) in the screen on the 11th. Ground frosts occurred at one place or another on 25 nights. Some were fairly severe, 8° F. being recorded at Balmoral on the 11th and 9° F. at Dumfries on the 10th.

Rainfall on the whole was rather more than an inch above normal. The excess was greatest in the counties of Sutherland and Inverness, the former having more than double its usual amount. Several places in this area reported more than 20 inches during the month, and Loan, in the Loch Quoich district, had 27·3 inches. Over much of east Scotland, on the other hand, the month was drier than usual. The coast district from Aberdeen southward was all included in this dry area, but the deficit was most marked in parts of the south-east, some places there having only about half the normal. Swinton in Berwickshire recorded only 0·8 inch.

Snow fell in one place or another on all except three days. It was mainly light, but was widespread from the 20th to the 25th.

The month was generally dull. The north-east and east were favoured. Craibstone headed the list of sunshine totals there with 55 hours, or 3 below average. Fort William had only 3 hours (a record low total), and Glasgow only 5. There was less fog than usual. It occurred locally on 12 days.

FEBRUARY.

This was the driest February for ten years, and it was correspondingly bright. Also it was cold in the second fortnight after some pleasantly mild days during the first fortnight. There were three rather severe gales.

Mean temperature on the whole was practically normal. The exceptionally mild weather of January persisted until the middle of the month, and, so far as mean figures are concerned, almost balanced the coldness of the remainder. Regionally, however, the balance was less even, the mean on the Ayrshire coast, for example, being about $1\frac{1}{2}$ degrees below normal. During the mildest spell, shade temperature rose on the 1st and 2nd to 50° F. or more in all parts except the extreme north. Kirkcaldy and Boghall had 57 on the 1st, and Arbroath, Perth, Longforgan, and St Andrews reported this reading on the 2nd. In the last three days of the month frosts at high levels were the most severe of the winter. Braemar recorded 5° F. in the screen on the 28th. Ground frosts occurred in places every night from the 3rd to the 29th; the most severe of them was also at Braemar on the 28th, 29 degrees of frost (3° F.) being registered.

Rainfall for the country generally was little over half the average. There was, as usual, much more in the west than in the east. It was fairly frequent in the west and north, where the number of rain days varied from about 16 to 22, but the falls were as a rule light. In the east, rain days numbered about 7 to 14, and at many stations the month's total was under an inch. Dunfermline had only 0.46 inch, Dundee 0.54, and Edinburgh 0.74. In the wet area Loan had 9.56 and Glenquoich 8.52. There was snowfall at widespread places from the 3rd to the 10th and the 25th to the 29th. The heaviest falls occurred on the 26th and 27th, at which time Deeside had some 16 inches. At the same time Skye, north Argyll, Sutherland, and Caithness had drifts ranging up to 12 feet deep. There were heavy falls also in the southern counties.

The month was exceptionally sunny in many parts and about average elsewhere. The Solway, Renfrew, Dumbarton, Stirling, and the Firth of Tay area had sunshine totals ranging from 20 to 40 hours above their averages. Places in the Islands, the North, the Lothians, and Berwickshire, on the other hand, were rather below average. Longforgan (Dundee) headed the list with 100 hours, and there were a number of stations with totals between

90 and 100 hours. Only five had less than 50 hours. The lowest was Fort Augustus, with 38. Fog was reported on 18 days—most frequently at Greenock (10 days) and West Linton (7 days).

MARCH.

Despite the occurrence of the heaviest snowfall of the winter in the first week, March was even drier than February. Except for 1929, it was the driest March over Scotland generally for about 90 years. Precautions against a summer water shortage were taken widely. Conditions varied from sunny in the south to dull in the north. They were relatively quiet, none of the nine gales reported being severe.

Mean temperature was about $\frac{1}{2}$ degree above normal. The cold of late February persisted until the 7th, but was more than offset by the almost uninterrupted mildness of the rest of the month. The mildest regions were in the counties of Renfrew, Perth, and Aberdeen, where the averages were about 2 degrees above normal. In Ayrshire the means were normal or rather below. The end of the month had warm days on which temperature rose to 60° F. or more in many parts. Readings of 61 and 62 were reported from Forres, Kilmarnock, Dumfries, Edinburgh, and Arbroath among other places between the 24th and the 28th. On the other hand, the cold spell in the early part of the month and also the 15th had fairly sharp frosts, with temperatures of from 13° to 15° F. at Penicuik, West Linton, Braemar, and elsewhere. Ground frosts were frequent but not severe except from the 2nd to the 4th and on the 9th and 15th. West Linton had 5° F. (27 degrees of frost) and Dumfries 6° F. on the 15th.

Weather was remarkably dry everywhere except in the extreme north and north-west. There the rainfall totals were about normal, but large areas in the south recorded only a quarter of the usual amount. Loch Leven had 0.25 inch, a figure lower than that of any March for over 100 years there. Perth had 0.19, and at other places in the east and south the totals reached only about one-tenth of the usual amount. In the Perth-Crieff area there was no rain from 26th February to 11th March. Snowstorms which set in on the 1st of the month occurred all over the country and were in many places the worst of the winter. Some districts of Caithness and Sutherland were isolated for a week, drifts reaching 30 feet deep. Even Tiree had blocked roads until the 4th.

Sunshine was on the whole below average north of a line from the Clyde to Montrose, and above average south of it. In the north the totals ranged from 65 hours at Stornoway to 79 at Fort Augustus, or some 35 to 45 hours smaller than usual. Farther south Turnberry headed the list with 140 hours, followed by Arbroath with 132. There were numerous stations with over 120 hours. Six of the finest days all had 9 or 10 hours' sunshine in places. There was scattered fog on 18 days.

APRIL.

April justified its reputation for variability. Widespread snow showers and exceptional frost introduced it. Later on dull and showery weather was broken by a few beautiful days on which temperature rose well above normal. The third week was very wet, but the last week practically rainless. Gales were reported on 8 days.

Mean temperature was markedly above the average, the excess being over 3 degrees. This compares with some 4 degrees in April 1943, which broke all records. On the warmest five days of the month temperature reached well over 60° F. in most parts. The highest reading was 67 at Stonehaven on the 30th, but 66 was recorded at various places on the 13th and from the 27th to the 30th. A brief frost at the beginning of the month was both general and severe for the season. Peebles reported 15° F. in the screen, and Braemar, West Linton, and Wolfelee had comparable readings. There were in all 23 nights of ground frost, the lowest temperatures being from 8° to 14° F. on the 1st.

The month overall had slightly more rainfall than usual. Relatively dry regions were the north-western counties, Deeside, and the south. Of these, Deeside had the smallest totals, and for this district Balmoral was outstanding, with only 1.03 inch. In the belt between Fort William, Montrose, Turnberry, and Dunbar, however, rainfall exceeded the average, most of the rain falling in two periods, namely, the 1st to the 5th and the 15th to the 24th. The Firth of Tay and Glasgow areas each had about 50 per cent more than usual. Snow fell in all parts on the 1st, but did not lie to any depth. There was considerable drifting on the 2nd and light showers on 4 other days in the course of the month.

Places with more than their normal sunshine were few in April and were restricted to the east of the country, but there were 6 days in these parts with upwards of 10 hours' bright sunshine. In the west and north cloudy weather prevailed, several stations reporting little more than half as much sunshine as usual. Leuchars had the largest total, namely, 153 hours, and at a number of the other eastern stations the figures were between 130 and 150. Duntulm (Skye) had only 80 hours as compared with 233 in April 1942, and Tiree was 77 hours short of its average. There was considerable haar fog on the east coast (about 5 days) and a similar frequency of fog in the Clyde area.

MAY.

Weather fluctuated again in May, and there was considerable frost. The last week, however, had a short spell of warmth. Sunshine was deficient everywhere and rainfall notably excessive in the west. There were gales on 11 days.

On the whole the mean temperature was somewhat above

normal, a deficiency in the western parts from Skye southwards being rather more than offset by slight excesses elsewhere. In the course of the month conditions alternated between mild and cold at intervals of a few days. The first 2 days were mild; then followed a cold spell until the 7th, bringing the lowest temperatures of the month at many places. Readings of 27° and 28° F. were reported from the counties of Aberdeen, Argyll, Lanark, and Peebles. From the 8th to the 13th was warmer, some places in Aberdeen and Angus having their warmest day of the month (69° F.) on the 11th. There followed another cool week during which Braemar had 25° F. on the 22nd. The last week, and especially the last 3 days, was much warmer. In the south and south-west on the 29th and 30th maxima of 80° F. were reached. Ground frosts were frequent during the month. Between the 4th and the 6th and 15th and 22nd Dumfries had a reading of 16° F., Braemar 21, and places in Argyll 19° F.

In most districts rainfall was greater than usual, and especially so in the west of Inverness-shire, where some totals were more than double the average. At Fort William there have been only two wetter Mays since 1875. A few parts of Angus, Fife, East Lothian, and the Solway district, however, had amounts below average. Weather was very wet at the beginning of the month, very heavy falls being recorded in the north-west. The east had heavy falls on the 18th and 19th, and the west and north on the 24th. The intervening periods were less wet. Snow or sleet fell over the greater part of the country between the 3rd and the 5th, and again towards the middle of the month.

The month was dull throughout the country, the shortage of sunshine being most marked in the north-west and decreasing southwards. Stornoway had only 93 hours, the lowest recorded there in May since 1881. Even the stations south of the Moray Firth had only between 90 and 100 hours. Tiree headed the list with 193 hours, which, however, was nearly 50 below normal. It was followed by stations in the south-west, which had between 150 and 180 hours. Local fog was reported on 10 days and fairly extensive fog in the east on the 30th.

JUNE.

June was a dull, wet, and rather cool month. There was only one week of warm weather. Of 6 gales reported, none was severe, but thunderstorms were unusually numerous and severe.

Temperature was below normal generally. Exceptionally cool weather persisted during the first half of the month and recurred in the last week. The intervening period, between the 16th and the 24th, was more seasonable. At Aberdeen on the 1st the maximum was only 47° F., and on the night 10th-11th minimum temperatures of 35 and 36 were recorded in the screen at $3\frac{1}{2}$ feet above the ground. The lowest reading was at Balmoral, namely, 34° F. on the night 14th-15th. The warmer conditions of the third week

brought readings of 76 to 79 at widely distributed stations such as Ardtornish, Glasgow, Kilmarnock, and Ruthwell, but elsewhere the maxima remained below 70. There were slight ground frosts on 8 nights.

Over most of the West Highlands the month was very wet, many places having more than double their normal amounts. Elsewhere the totals were also above normal, Edinburgh being the only station which recorded its average rainfall. The wet periods coincided with the cool periods, namely, the first fortnight and the last week. In general, the only dry periods were the 7th and the 16th to the 23rd. Thunderstorms were prevalent on 13 days. On several days they were widespread and severe. Hail accompanying them was reported on 7 days, and damage by lightning occurred near Aberdeen and Dunbar. Near Garelochhead considerable flooding resulted.

As in May, there was a great lack of sunshine everywhere. Many places had less than 100 hours and the highest totals were under 175. Leuchars headed the list with 173 hours—*i.e.*, 30 below normal—and Fort Augustus was at the foot with only 75 or little more than half the normal. There were, however, one or two good days, for example Tiree had over 15 hours' bright sunshine on the 21st and Leuchars 14½ on the 24th. Fog was reported locally on 8 days.

JULY.

The dull conditions prevailing over the whole country since May continued during July. Weather was of a showery type, with cool days but mild nights. The finest spell was from the 16th to the 24th. No gales were reported.

Mean temperature for the month was above normal over the greater part of the country. Very mild nights even during the cool periods were a good deal responsible for this. Day temperatures were mainly below normal, and several days were notably cool. Most places had their highest temperatures on the 17th. Glasgow and Kilmarnock headed the list with 79° F. on that day. Other warm days on which readings ranged from 75 to 78 at widely spread stations were the 8th, 27th, and 31st. The lowest reading of the month was 39° F. at Kettins on the 21st, and comparable temperatures occurred there and elsewhere on 22nd and 23rd. No ground frost was reported anywhere.

The month's rainfall was below normal generally, and markedly so in some parts, the rain being showery rather than persistent. The totals were most below the average to north and west of the Great Glen, the deficiency there being about 50 per cent. In the Islands, Stornoway had only 0.67 inch, that is, about one-quarter of the usual amount. On the other hand, in some localities south of a line from Arbroath to the Clyde thunderstorms raised the totals to rather above normal. In all, there were 11 days with thunderstorms, the most generally disturbed period being the 26th

to the 29th. Floods occurred in the Clyde area on the 2nd, which was the wettest day of the month. There was also flooding in Edinburgh on the 27th, due to a remarkably local fall.

Weather was exceptionally dull in parts, a number of places in the east and south having their dullest July on record. Deficiencies of sunshine were not so marked in the north and west, while in the Islands figures reached or exceeded the average. Many stations had between 80 and 100 hours less than their usual amounts, the extreme among these being Marchmont, with a total of only 71 hours, or 93 less than the average and the smallest total in July since 1881. Other places, including Dumfries and Paisley, also had their lowest recorded figures. On the other hand, Stornoway reported 171 hours or 26 above the average. Duntuiln (Skye) occupied second place, with 138 hours. There was fairly frequent coast fog in the east and among the Islands, some places having fog on 7 days.

AUGUST.

This month was the warmest of the year, and had a noteworthy warm dry spell in the first week. Many fine sunny days occurred in the west and centre of the country, though the east and south-east were dull. As in July, weather was of the showery type and rainfall generally less than usual. Thunderstorms were numerous and there were gales on 3 days.

Mean temperature was 2 degrees above normal. In the fine spell during the first week shade temperatures rose to 80° F. between the 2nd and the 7th. The highest reading was 81 at Fort Augustus on the 2nd, but 80 was reached at widespread places on the 2nd, 4th, 5th, and 7th. The coldest conditions occurred between the 20th and the 23rd. At this period high-level stations like Braemar had frost at night, while day temperatures below 55 were fairly common. Ground frosts were local on 3 nights and widespread on the 22nd, when Balmoral had 12 degrees of frost on the ground and Braemar 9 degrees.

Rainfall totals were in general only about three-quarters of the average, although there were 18 to 20 rainy days. The north-east was specially dry. In this area Aberdeen with only 0.90 inch (one-third of the average) had its driest August since 1899. The exceptional localities with totals above the average were in Gallo-way, the Glasgow area, and the extreme north-west. Except for a few local thunderstorms the first 6 days of the month were dry. Weather then became showery until the 19th, and the last week from the 23rd was wet in all parts. Thunderstorms were reported on 18 days, and some were exceptionally severe. There was severe local flooding in Banffshire on the 4th, in east and central districts on the 7th, and on Speyside during the 8th and the 10th. The last week was also very thundery.

Totals of bright sunshine were remarkably high in the centre, west, and north of the country, and also on the Ayrshire coast.

Stations in the Great Glen, the Moray Firth area, the Hebrides, Orkney, and Ayrshire reported amounts 40 hours or more above the average. Individual sunny days were distributed throughout the month in these areas, and there was a very fine spell from the 2nd to the 6th. The largest total for the month, namely, 192 hours, was reported from Banff. This was 57 hours above the average. Numerous stations in the areas mentioned had between 170 and 190 hours. On the other hand, along the east coast and in the south-east totals for the month were in places as much as 50 hours below average. Kirkcaldy had only 81 hours. There was considerable east coast fog during the month, especially in the first week.

SEPTEMBER.

The month was wet and cold for the season, apart from two brief fair intervals, the harvest being affected very adversely. The first snow of the autumn fell in the hills on the 7th. Gales were reported on 4 days and thunder on 9.

Mean temperature for the whole country was decidedly low. In parts of Fife, Dunbarton, Berwickshire, and Ayrshire it was 2 or 3 degrees below normal. There were spells of exceptionally cool weather from the 7th to the 13th and on the 24th-25th, slight frosts being reported from many places, especially at high levels. From the 17th to the 19th was, on the other hand, both warm and fine with temperatures of 70° F. or more at widely separated places. The highest readings were 75 at Gordon Castle and 74 in Edinburgh on the 18th. In the cool spells Braemar had 26° F. (6 degrees of frost) in the screen on the 12th and Dalwhinnie 29° F. on the 10th, 12th, and 25th. Ground frosts occurred on 15 nights, the lowest temperature on the ground being 20° F. at Balmoral on the 11th.

Rainfall was above the average in most parts; though Shetland, the West Highlands, and Aberdeen city had less than usual. The wet weather of the last week of August persisted in the first week of September. A fine spell then followed from the 7th to the 13th, but thereafter rainfall persisted generally except on three days between the 17th and the 21st. The amounts were most markedly above normal in the south, and especially in the Lothians, which had over double their normal. Edinburgh has experienced only one wetter September (1927) in the past 70 years.

Over most of the country the month was a dull one. The south and south-east had least sunshine, the totals there being 30 to 40 hours less than usual. On the other hand, the Western Isles and scattered places on the mainland had a bright month. Glasgow reported only 79 hours and various other stations from Fort William and Dalwhinnie to Dumfries only between 80 and 90. In the Islands, however, Tiree registered 155 hours or 24 hours above the normal, and totals between 130 and 150 were numerous in other parts of the favoured areas. There was a good deal of fog on the east coast and along the Clyde.

OCTOBER.

The wet, cool weather of September persisted for the greater part of October, and sunshine was below normal except over the northern islands and the south-west of the mainland. Gales were reported on 11 days and thunderstorms on 9.

Mean temperature for the month was below normal, except locally in the north and north-west. There was only one spell of fine weather, namely, from the 6th to the 12th. In the course of this period, especially on the 6th, day temperatures were upwards of 60° F., chiefly in parts of the centre and east, though the highest reading occurred in the west, namely, 66° F. at Benmore, near Dunoon. On the whole the night temperatures were about normal, the low mean for the month being due to cool days. There were frosts in the south at the beginning of the month and at high levels in the centre at the end. On the 2nd, for example, Eskdalemuir reported a screen reading of 23° F., and on the 30th Braemar had 23° F. Ground frost was frequent but mainly slight, though temperature fell to 17° F. at high levels.

Rainfall, which was persistent rather than heavy, exceeded the average nearly everywhere. Totals were above average by about 50 per cent in the west and north-west and locally in the east, while there were slight deficiencies locally in the counties of Aberdeen, Perth, the Lothians, and Berwick. The only extended fairly dry spell was from the 6th to the 9th. Most of the stations in the west had 25 rain days and Achnashellach had 28. The east and south-east, which were not so wet, had rain on about 20 days. Scattered falls of snow were reported on 7 days and hail on 9.

The month was dull in most districts, many sunshine totals being from 20 to 40 hours below the average. In Orkney, however, Kirkwall had 93 hours or 14 hours more than usual, and in the south-west some places just reached their average. The greatest actual amounts were recorded in the customarily favoured coast districts of Fife and Angus; nevertheless they were somewhat below normal. The Leuchars total of 100 hours (6 below normal) was approached by a number of stations with between 90 and 100. Fort William had only 40 hours, and other places, from Skye to north Argyll and the central mountains, between 40 and 69. There was much coast fog and some fog inland also.

NOVEMBER.

The month was, with the exception of November 1939, the wettest November for over 50 years, the coldest for nearly half that period, and exceptionally stormy, with gales on 18 days. Snow and sleet showers were frequent.

Mean temperatures were well below normal over the whole country, and specially low at high-level inland stations. The average deficit was about $1\frac{1}{2}$ degrees. On only 5 days during the

month did day temperature rise beyond 50° F. The highest reading was 57 at Dunbar on the 4th, and a few stations had 56° F. on the 2nd, 4th, and 22nd. The nights of the 26th and 27th were exceptionally cold, Dalwhinnie reporting 10° F. (22 degrees of frost) on the morning of the 27th. Other stations in the Cairngorms and also West Linton had comparably low temperatures at that time. Ground frost occurred every night at one place or another. The most severe ground frosts were recorded at the same places and on the same dates as those in the screen. The most severe, 31 degrees of frost, was at Dalwhinnie on the 27th.

Rainfall was much above normal everywhere except at a few places in the north-west and on the Aberdeenshire coast, which had a little less than the average. The most marked excesses were in Fife, the Lothians, and the Border counties, stations there reporting more than twice as much as usual. Edinburgh surpassed its figures for September and had 6.13 inches, the greatest fall in November for a hundred years. Snow-showers were widespread, especially in the second and third weeks. On the 9th snow lay 6 inches deep in parts of Ross-shire, and Braemar had nearly 6 inches lying on the 16th.

Sunshine was scanty in Shetland, along the Great Glen, and in the south, but elsewhere was normal or slightly above it. The smallest amount was 21 hours at Fort William (4 hours below normal), and a number of widely separated places had less than 40. Arbroath, Longforgan (Dundee), and Leuchars headed the list with 75 hours, which was some 5 to 8 hours above normal. Fog was reported on 19 days. It was persistent in the Clyde and Forth areas on 5 or 6 days.

DECEMBER.

Wintry weather, cold and showery, relieved however by a few bright days, prevailed during December. There was heavy rain, heavy snow, and a spell of frost. Gales were reported on 12 days, that of the 17th being one of the severest of the year.

The mean temperature of the month for the whole country was about half a degree below normal. The lowest temperatures occurred in the Cairngorms and the southern Uplands. These places had notably low temperatures during the second week and near the end of the month. Braemar registered the lowest temperature in the screen, namely, 16° F. on the 13th, but West Linton was only 1 degree higher. Mild conditions with readings of 52° F. or more were reported widely from the east and south on the 1st and the south-west on the 22nd, and similar temperatures occurred locally between the 16th and the 21st. The highest temperature, 54° F., was recorded at Benmore (near Dunoon) on the 1st and Balfron (Stirlingshire) on the 22nd. There was ground frost every night except the 1st, and temperature on the ground fell to 9° F. at high levels.

In the west and north-west there were very few dry days,

nevertheless rainfall totals were only slightly above the average. In the east and south there were four spells lasting from 2 to 5 days with very little rain. For these areas the month's rainfall was generally rather below average, but two isolated stations in Ayrshire and Peeblesshire recorded about 50 per cent more than usual. The wettest period was from the 11th to the 16th. This had four outstandingly wet days on which over 2 inches of rain fell at a few stations. There was a good deal of snow in the first fortnight. Severe storms in the first week blocked the Ullapool roads from the 8th to the 17th, Deeside had heavy falls of a foot or more on the 10th-11th, and places on Speyside similar amounts on the 12th.

Sunshine totals on the whole were normal or rather above normal. The area bounded roughly by Perth, St Andrews, Paisley, and Dumfries had considerably more than usual, and Fort Augustus had a small excess. Stirling headed the list of totals, with 52 hours or double the normal amount. Leuchars, with 51 hours, was only 7 above its normal. A number of other stations had over 40 hours. Fort William registered its normal amount, which is only 7 hours owing to cut-off by the surrounding hills. There were other low totals of 11 or 12 in Shetland and the Glasgow area. Fog occurred chiefly in and south of the Forth-Clyde belt. It was frequent there in the last fortnight, and dense on the 23rd.

RAINFALL (MEASURED IN INCHES) FOR 1944

AT SELECTED STATIONS IN SCOTLAND.

	Jan	Feb.	Mar.	April	May	June	July	Aug	Sept.	Oct	Nov	Dec	Year
Shetland—Lerwick	4.57	2.79	2.43	2.65	2.71	2.69	1.98	1.85	2.49	4.41	4.56	4.61	37.74
Calthness—Wick	3.66	1.99	2.67	2.04	2.40	2.95	1.87	1.58	3.07	3.00	4.23	3.13	32.09
Sutherland—Melvich	5.50	3.18	3.58	2.97	3.26	3.89	1.42	2.56	5.27	4.55	6.45	3.89	48.52
Lairg	7.67	3.15	2.33	1.81	3.53	4.03	1.43	2.35	3.90	4.74	6.41	4.48	45.98
Ross and Cromarty—													
Fortrose	3.18	2.28	1.72	1.50	2.24	2.70	1.31	1.75	2.70	3.73	3.35	2.85	29.31
Lochcarron	11.66	4.70	7.11	4.73	5.84	8.30	1.84	4.40	5.70	8.64	6.25	9.44	78.61
Stornoway	5.61	1.94	4.23	1.33	2.21	4.19	.67	3.97	3.39	5.24	4.53	5.35	42.71
Inverness—													
Inverness	3.00	2.12	1.40	1.89	1.88	2.77	1.74	1.81	3.19	2.65	2.87	2.33	27.65
Fort William	12.75	4.87	3.56	5.23	7.64	6.56	2.05	4.41	5.13	7.73	8.50	9.10	77.58
Glenquoich	20.90	7.65	7.68	6.95	11.18	11.59	2.54	6.55	9.83	12.05	12.15	10.18	118.95
Portree	11.84	4.84	4.78	3.23	6.35	6.33	2.45	5.72	4.88	9.61	7.32	10.46	77.66
Nairn—Nairn	2.31	1.59	1.28	1.54	1.52	2.42	1.11	1.40	2.20	2.56	3.16	2.15	23.24
Moray—Gordon Castle	3.04	2.10	1.83	1.10	3.03	3.81	2.13	2.20	5.03	3.32	4.32	3.51	34.02
Aberlour (Wester													
Elchies)	2.72	2.77	1.87	1.25	2.54	2.53	1.62	1.33	4.27	3.10	3.11	3.02	30.18
Banff—Banff	2.88	2.38	1.66	1.21	2.23	2.56	2.16	1.06	4.16	3.16	3.07	2.84	29.35
Aberdeen—Peterhead	2.20	1.93	1.72	2.34	2.85	2.04	3.00	1.86	2.19	3.43	2.96	2.97	28.29
Aberdeen (King's Coll.)	1.56	1.70	1.41	2.21	2.72	2.25	1.98	.90	2.05	3.19	2.61	3.54	26.12
Balmoral	2.48	2.06	.81	1.03	3.03	2.33	1.87	2.06	4.21	4.45	4.73	3.24	32.35
Kincardine—Fordoun	1.62	1.25	.99	2.24	3.20	2.79	2.64	1.27	2.29	7.08	5.32	3.22	33.91
Angus—													
Montrose (Asylum)	1.14	.90	.75	2.62	2.75	2.41	1.99	1.33	2.03	4.57	2.95	2.97	26.41
Dundee	1.35	.54	.41	2.33	1.93	2.70	2.12	1.62	2.50	3.53	4.25	2.27	25.65
Glamis Castle	1.90	.87	.40	2.74	2.63	3.32	3.04	1.53	3.07	3.42	4.40	2.77	29.14
Brechin	1.41	.95	.66	2.08	2.70	2.99	3.42	1.66	2.35	4.94	3.69	2.98	23.83
Perth—Blair Castle	4.02	1.38	.80	2.38	2.10	3.21	3.12	2.99	2.93	4.13	4.57	4.01	35.70
Orfif	3.21	1.18	.33	2.87	2.12	2.86	4.34	3.19	3.38	4.11	6.50	4.50	38.69
Perth	2.34	.87	.19	2.09	1.93	2.54	2.03	2.36	2.90	2.78	4.85	2.67	27.55
Fife—Cupar	1.69	.75	.43	2.24	2.17	2.24	2.89	2.27	2.94	3.82	5.24	3.15	29.83
Kirkcaldy	1.95	.81	.33	1.73	1.90	2.54	3.53	3.37	3.19	3.20	5.77	1.66	30.28
Kinross—Loch Leven	2.60	.91	.23	2.38	2.10	3.31	2.58	2.93	2.46	3.39	7.12	2.82	32.81
Clackmannan—													
Tillicoultry	3.29	1.16	.20	2.19	1.98	2.48	2.66	2.67	3.45	3.71	6.25	4.66	34.70
Argyll—Gruin (Mull)	7.91	2.96	2.90	3.89	4.92	4.90	2.59	4.06	5.70	10.49	10.70	8.83	69.85
Oban	6.33	2.26	1.31	3.50	5.06	4.62	2.18	5.17	4.70	6.14	6.74	5.85	53.86
Glencoe Gardens	10.65	4.11	2.41	6.11	6.88	5.97	2.69	6.00	5.68	9.85	10.96	11.35	81.24
Inveraray	13.78	4.57	2.48	4.86	6.05	6.86	2.77	6.31	6.55	7.51	11.19	9.87	82.80
Bute—Rothesay	5.80	2.06	1.60	3.32	4.16	4.45	4.17	3.63	6.33	6.65	8.22	6.34	56.73
Stirling—Stirling	4.42	1.11	.86	2.24	2.24	3.11	2.81	3.04	4.19	3.69	6.12	3.90	37.23
Dumbarton—Arrochar	9.52	3.48	1.67	3.25	5.46	5.87	4.05	5.90	6.76	8.21	10.87	8.01	73.05
Helensburgh	8.00	2.54	1.52	3.62	4.04	4.21	5.20	3.84	5.01	5.24	8.23	5.90	57.35
Renfrew—Greenock	8.52	2.38	1.47	3.38	4.90	5.04	5.17	3.91	5.70	6.55	9.49	7.54	64.53
Paisley	4.57	1.63	.74	2.66	3.17	3.61	2.92	3.04	4.70	5.53	7.64	4.32	44.43
Ayr—Kilmarnock	5.21	1.77	.45	3.33	3.23	3.52	3.92	3.80	5.63	5.64	6.42	4.99	47.91
Ayr	3.62	1.06	.49	3.13	3.36	3.10	2.65	2.26	3.74	4.31	5.87	4.17	36.69
Muirkirk	6.39	2.01	.93	2.93	3.24	3.76	3.22	5.22	5.98	4.56	8.25	6.43	52.92
Ballaistræ	4.04	1.68	.50	1.89	2.54	3.47	2.32	3.32	4.15	5.56	5.32	7.02	42.81
 Lanark—													
Glasgow (Botanic Gdns.)	3.72	1.64	.84	2.36	2.00	2.57	2.99	3.00	4.44	4.49	6.65	4.15	39.45
Douglas (Newmains)	4.69	1.61	.47	3.75	2.79	3.10	3.67	3.88	4.08	4.36	7.90	5.11	45.41
Biggar	3.02	.93	.55	2.79	1.79	3.12	2.04	2.98	3.89	3.53	6.52	4.22	35.38
 Linlithgow—													
Houston House	3.65	1.07	.58	2.31	2.96	3.27	2.87	4.03	4.21	3.95	6.81	3.35	39.06
Midlothian—													
Edinburgh (University)	1.98	.80	.58	1.80	2.38	2.11	3.14	2.88	4.69	2.38	5.41	2.19	29.84
Oxenford Castle	1.81	1.40	.53	1.50	2.02	2.23	2.19	3.29	4.90	2.69	5.89	2.47	31.52
Haddington—													
North Berwick	1.12	.90	.33	1.05	1.50	3.11	2.35	2.99	3.95	3.05	4.44	1.52	26.21
Stobabs Reservoir	2.17	1.96	.75	1.83	3.12	2.15	2.20	2.97	5.39	2.50	6.29	3.07	34.46
Berwick—Duns Castle	1.23	1.12	.81	1.89	2.64	3.71	2.90	2.98	4.55	2.07	5.78	2.23	33.69
Marchmont	1.12	1.72	.75	1.90	2.74	2.71	3.12	2.42	4.48	2.84	5.80	2.24	31.84
Peebles—West Linton	3.31	1.93	.67	1.78	3.29	3.38	3.36	3.88	3.24	8.05	4.56	4.56	41.40
Selkirk—Caddonfoot													
(Fairnlee Gardens)	2.32	2.21	.50	2.03	2.15	2.45	2.24	2.55	4.76	2.95	4.90	2.90	32.02
Roxburgh—													
Kelso (Broomlands)	1.05	1.47	.98	1.51	2.73	2.56	2.39	1.65	4.11	3.20	4.94	1.96	27.55
Wolfelee	2.37	2.25	.56	1.86	2.27	2.47	2.16	1.63	4.87	3.08	5.89	4.40	38.41
Dumfries—Dumfries	3.85	.89	.30	2.00	2.19	2.99	4.53	2.73	5.87	4.47	6.51	5.40	41.75
Langholm	6.30	2.50	.30	3.19	3.16	3.33	3.37	5.56	5.60	4.40	9.50	6.41	55.68
Eskelemdur	7.36	3.60	.67	3.73	3.85	5.62	3.12	4.24	6.18	4.55	10.34	8.22	61.98
Kirkcudbright—Castle													
Douglas (Corbleton)	4.03	1.36	.45	2.57	2.42	3.76	4.34	3.77	5.17	5.45	7.42	6.63	47.37
Carrpatrick (Cornharrow)	6.07	2.02	.65	4.66	2.92	4.14	5.77	4.02	5.55	6.27	7.23	7.81	59.11
Ardenhall	5.27	2.01	.32	2.81	2.67	4.03	4.83	4.25	5.65	5.70	9.03	5.97	52.59
Wigtown—Monreith	3.73	1.36	.42	2.67	1.70	2.50	3.13	4.33	6.26	6.35	7.14	4.07	43.72

AGRICULTURAL STATISTICS.

NOTE.—OWING TO WAR-TIME RESTRICTIONS, DETAILS UNDER TABLES 1-20 ARE NOT AVAILABLE.

EDINBURGH CORN MARKET.

STATEMENT SHOWING THE PRICES OF WHEAT, BARLEY, AND OATS FOR THE YEAR 1944

The Corn Sales Act of 1921 provides that all sales are to be effected by weight only, and expressed in terms of or by reference to the hundredweight of 112 lb. Experience has proved it to be convenient to quote at a price per 4½ cwt. for Wheat, 4 cwt. for Barley, and 3 cwt. for Oats

The following statement gives a record of the year's proceedings in Edinburgh Corn Market.

1944	WHEAT, per 4½ cwt				BARLEY, per 4 cwt				OATS, per 3 cwt			
	Highest		Lowest		Highest		Lowest		Highest		Lowest	
	s	d	s	d	s	d	s	d	s	d	s	d
January	5	67	6		110	0	105	0	46	3	43	6
"	12	67	6		110	0	105	0	46	3	43	6
"	19	67	6		110	0	105	0	46	3	43	6
"	26	67	6		110	0	105	0	46	3	43	6
February	2	69	0		110	0	105	0	47	3	44	6
"	9	69	0		110	0	105	0	47	3	44	6
"	16	69	0		110	0	105	0	47	3	44	6
"	23	69	0		110	0	105	0	47	3	44	6
March	1	70	6		110	0	105	0	47	3	44	6
"	8	70	6		110	0	105	0	47	3	44	6
"	15	70	6		110	0	105	0	47	3	44	6
"	22	70	6		110	0	105	0	47	3	44	6
"	29	70	6		110	0	105	0	47	3	44	6
April	5	72	0		110	0	105	0	48	9	46	0
"	12	72	0		110	0	105	0	48	9	46	0
"	19	72	0		110	0	105	0	48	9	46	0
"	26	72	0		110	0	105	0	48	9	46	0
May	3	72	0		110	0	105	0	48	9	46	0
"	10	72	0		110	0	105	0	48	9	46	0
"	17	72	0		110	0	105	0	48	9	46	0
"	24	72	0		110	0	105	0	48	9	46	0
"	31	72	0		110	0	105	0	48	9	46	0
June	7	72	9		110	0	105	0	48	9	46	0
"	14	72	9		110	0	105	0	48	9	46	0
"	21	72	9		110	0	105	0	48	9	46	0
"	28	72	9		110	0	105	0	48	9	46	0
July	5	72	0		110	0	105	0	48	9	46	0
"	12	72	0		110	0	105	0	48	9	46	0
"	19	72	0		110	0	105	0	48	9	46	0
"	26	72	0		110	0	105	0	48	9	46	0
August	2	58	6		100	0	90	0	44	3	42	0
"	9	58	6		100	0	90	0	44	3	42	0
"	16	58	6		100	0	90	0	44	3	42	0
"	23	58	6		100	0	90	0	44	3	42	0
"	30	58	6		100	0	90	0	44	3	42	0
September	6	58	6		100	0	90	0	44	3	42	0
"	13	58	6		100	0	90	0	44	3	42	0
"	20	58	6		100	0	90	0	44	3	42	0
"	27	58	6		100	0	90	0	44	3	42	0
October	4	60	9		100	0	90	0	44	3	42	0
"	11	60	9		100	0	90	0	44	3	42	0
"	18	60	9		100	0	90	0	44	3	42	0
"	25	60	9		100	0	90	0	44	3	42	0
November	1	61	6		100	0	90	0	44	9	42	0
"	8	61	6		100	0	90	0	44	9	42	0
"	15	61	6		100	0	90	0	44	9	42	0
"	22	61	6		100	0	90	0	44	9	42	0
"	29	61	6		100	0	90	0	44	9	42	0
December	6	62	3		100	0	90	0	45	3	42	6
"	13	62	3		100	0	90	0	45	3	42	6
"	20	62	3		100	0	90	0	45	3	42	6
"	27	62	3		100	0	90	0	45	3	42	6

PRICES OF SHEEP SINCE 1818.

TABLE No. 1.—CHEVIOT SHEEP.

Year.	Wethers.		Ewes.		Lambs.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1818	28 0	to 30 0	not quoted.		8 0	to 10 0
1819	25 0	" 27 0	15 0	to 17 0	10 6	" 12 0
1820	20 0	" 25 0	16 0	" 17 0	10 0	" 11 0
1821	18 0	" 20 0	14 0	" 16 0	7 6	" 8 0
1822	12 6	" 18 0	8 0	" 8 6	4 6	" 0 0
1823	18 6	" 18 0	7 0	" 10 6	5 6	" 6 0
1824	14 0	" 19 0	7 0	" 9 0	4 6	" 6 0
1825	29 0	" 32 0	15 0	" 19 0	9 0	" 10 6
1826	17 6	" 21 6	18 0	" 15 0	7 0	" 7 6
1827	16 0	" 24 0	not quoted.		7 0	" 8 0
1828	18 0	" 27 6	12 0	to 15 0	7 0	" 8 8
1829	18 0	" 24 0	12 6	" 14 0	7 0	" 8 6
1830	15 0	" 21 0	8 0	" 11 0	6 0	" 6 9
1831	18 0	" 25 0	9 0	" 13 0	7 0	" 8 0
1832	19 0	" 24 0	11 0	" 16 0	7 0	" 9 0
1833	22 0	" 31 0	18 6	" 20 0	8 0	" 11 8
1834	22 0	" 31 0	18 6	" 21 0	9 0	" 11 6
1835	22 0	" 27 6	18 0	" 20 6	8 0	" 11 0
1836	24 0	" 31 6	16 0	" 19 0	10 0	" 14 0
1837	19 0	" 28 0	14 0	" 19 0	10 0	" 18 0
1838	25 0	" 30 6	17 0	" 22 0	12 0	" 14 0
1839	25 0	" 31 0	14 0	" 19 0	0 0	" 18 0
1840	24 0	" 35 0	15 0	" 22 0	7 0	" 11 6
1841	25 0	" 30 0	14 0	" 22 0	8 0	" 12 0
1842	22 6	" 38 0	13 6	" 17 6	7 6	" 10 0
1843	19 0	" 25 0	8 0	" 12 6	5 0	" 8 0
1844	21 0	" 29 0	10 0	" 16 0	8 0	" 10 6
1845	25 0	" 35 0	13 0	" 20 0	8 0	" 18 0
1846	24 0	" 38 6	14 6	" 21 6	10 0	" 14 6
1847	24 0	" 35 0	18 0	" 24 0	11 6	" 15 0
1848	25 0	" 34 6	18 0	" 28 0	11 6	" 15 0
1849	21 0	" 30 2	12 0	" 21 0	0 0	" 14 0
1850	20 6	" 29 6	13 0	" 20 0	8 0	" 18 0
1851	21 6	" 31 0	18 0	" 21 0	8 9	" 14 0
1852	21 0	" 32 0	15 0	" 23 0	8 0	" 14 0
1853	26 6	" 38 0	17 0	" 28 6	9 0	" 17 0
1854	25 0	" 36 0	17 0	" 26 0	9 0	" 16 6
1855	23 6	" 36 0	16 0	" 25 0	10 0	" 17 0
1856	22 0	" 35 6	15 6	" 24 0	10 0	" 15 0
1857	24 0	" 36 0	14 6	" 26 0	10 6	" 14 6
1858	24 0	" 34 6	14 0	" 24 6	10 6	" 14 0
1859	25 0	" 34 6	16 0	" 25 0	10 8	" 14 9
1860	26 0	" 38 0	17 6	" 27 6	12 6	" 17 6
1861	25 0	" 38 6	16 0	" 28 0	9 0	" 16 0
1862	27 0	" 37 6	17 6	" 28 0	10 0	" 16 0
1863	25 0	" 38 6	19 0	" 28 6	10 6	" 16 0
1864	31 0	" 41 0	21 0	" 31 6	14 0	" 18 0
1865	32 6	" 44 0	22 6	" 38 6	14 6	" 20 0
1866	37 0	" 50 0	39 0	" 42 6	15 0	" 26 0
1867	26 0	" 58 0	18 0	" 25 6	12 0	" 16 0
1868	30 0	" 32 0	15 6	" 21 0	7 6	" 13 0
1869	28 0	" 38 0	15 0	" 22 6	7 6	" 14 0
1870	35 6	" 48 0	18 0	" 28 0	10 0	" 17 0
1871	36 6	" 49 0	22 0	" 38 6	14 0	" 20 0
1872	45 0	" 56 0	32 0	" 42 0	16 0	" 22 0
1873	42 0	" 51 0	25 0	" 42 0	15 6	" 22 0
1874	33 6	" 44 6	21 0	" 36 0	12 0	" 17 0
1875	33 0	" 48 6	21 0	" 34 0	13 6	" 23 6
1876	40 0	" 52 6	33 0	" 30 0	18 6	" 25 0
1877	41 0	" 51 0	25 0	" 37 0	15 0	" 24 0
1878	35 6	" 48 0	23 6	" 35 0	14 0	" 22 0
1879	34 0	" 44 0	21 0	" 34 0	14 0	" 20 0
1880	30 0	" 43 6	20 0	" 30 0	12 6	" 20 0
1881	32 0	" 45 6	29 0	" 34 0	14 0	" 20 0
1882	40 0	" 51 0	30 0	" 40 0	14 0	" 20 6
1883	44 0	" 55 6	34 6	" 46 6	15 6	" 23 0

TABLE No. 1.—CHEVIOT SHEEP—*Continued.*

Year.	Wethers.				Ewes.				Lambs.			
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
1884	36	0 to 47	6	29	6 to 41	6	12	6 to 20	0	0	0	0
1885	30	0 " 38	0	24	0 " 31	0	12	0 " 18	0	0	0	0
1886	32	0 " 40	0	21	0 " 29	0	12	0 " 19	0	0	0	0
1887	29	0 " 36	0	18	0 " 26	0	11	0 " 16	6	6	6	6
1888	30	0 " 38	0	19	0 " 27	0	12	0 " 17	6	6	6	6
1889	36	0 " 44	0	24	0 " 32	0	14	0 " 22	0	0	0	0
1890	31	0 " 40	0	22	0 " 30	0	12	6 " 20	0	0	0	0
1891	27	0 " 38	0	16	0 " 25	0	9	0 " 16	0	0	0	0
1892	22	0 " 30	6	13	0 " 22	0	5	0 " 11	0	0	0	0
1893	26	0 " 35	6	18	0 " 28	6	8	6 " 15	0	0	0	0
1894	26	0 " 37	0	20	0 " 31	0	10	6 " 18	6	6	6	6
1895	23	0 " 39	0	22	0 " 34	0	11	6 " 19	6	6	6	6
1896	24	6 " 34	0	19	0 " 30	6	9	0 " 16	6	6	6	6
1897	27	0 " 36	0	21	0 " 31	6	11	0 " 17	6	6	6	6
1898	27	0 " 37	0	22	0 " 32	6	12	0 " 18	6	6	6	6
1899	24	0 " 33	0	20	0 " 30	6	10	6 " 16	0	0	0	0
1900	26	0 " 36	0	22	0 " 32	6	12	0 " 17	0	0	0	0
1901	25	0 " 32	6	20	0 " 29	6	11	0 " 16	0	0	0	0
1902	24	0 " 31	6	18	0 " 27	0	9	6 " 14	6	6	6	6
1903	26	0 " 34	0	21	0 " 31	0	11	4 " 18	0	0	0	0
1904	23	6 " 36	6	23	0 " 32	6	13	0 " 20	0	0	0	0
1905	27	6 " 35	0	23	0 " 33	0	14	0 " 21	0	0	0	0
1906	30	0 " 38	0	26	0 " 34	6	15	0 " 23	0	0	0	0
1907	23	0 " 34	0	22	0 " 30	6	13	6 " 19	6	6	6	6
1908	26	0 " 32	6	21	0 " 27	6	11	6 " 17	0	0	0	0
1909	24	0 " 31	0	18	0 " 25	6	9	6 " 16	0	0	0	0
1910	27	0 " 35	0	22	0 " 31	0	12	0 " 20	0	0	0	0
1911	24	0 " 31	6	18	6 " 27	6	10	6 " 18	0	0	0	0
1912	26	0 " 34	6	22	0 " 31	0	13	0 " 21	0	0	0	0
1913	30	0 " 39	0	24	0 " 35	6	16	0 " 24	0	0	0	0
1914	32	6 " 41	0	28	0 " 39	0	18	0 " 27	6	6	6	6
1915	36	0 " 46	0	31	0 " 44	0	20	0 " 30	6	6	6	6
1916	40	6 " 51	0	34	0 " 49	0	22	0 " 34	6	6	6	6
1917	43	6 " 56	0	38	0 " 56	0	24	0 " 34	0	0	0	0
1918	50	0 " 66	0	42	0 " 61	0	25	0 " 37	0	0	0	0
1919	53	0 " 69	0	44	6 " 67	0	28	0 " 40	6	6	6	6
1920	56	0 " 71	0	48	0 " 79	0	34	0 " 49	0	0	0	0
1921	45	0 " 60	0	52	3 " 85	9	33	9 " 52	3	3	3	3
1922	40	0 " 56	0	56	0 " 90	6	27	0 " 50	0	0	0	0
1923	44	0 " 65	0	61	0 " 106	0	30	0 " 62	0	0	0	0

Year.	Wethers.		Ewes.		Lambs.				
					Wethers.		Ewes.		
	s.	d.	s.	d.	s.	d.	s.	d.	
1924	41	0 to 61	0	60	0 to 100	0	31	6 to 58	0
1925	39	3 " 50	0	56	0 " 38	9	22	3 " 50	6
1926	35	0 " 49	3	34	6 " 64	6	26	3 " 42	0
1927	38	9 " 46	3	32	6 " 55	6	23	3 " 39	0
1928	38	3 " 48	6	30	6 " 55	6	22	9 " 47	9
1929	33	6 " 54	6	34	9 " 52	0	25	6 " 47	0
1930	36	0 " 54	0	35	0 " 74	6	24	0 " 47	3
1931	34	0 " 45	6	23	0 " 50	9	17	0 " 27	0
1932	16	0 " 26	6	18	0 " 36	6	10	0 " 34	0
1933	16	0 " 23	0	25	3 " 40	0	16	6 " 31	6
1934	16	0 " 34	3	22	6 " 44	6	19	6 " 38	3
1935	22	0 " 37	3	24	0 " 44	3	16	0 " 38	3
1936	24	6 " 50	0	28	0 " 55	0	18	6 " 37	6
1937	24	6 " 49	6	29	9 " 76	6	19	0 " 45	3
1938	17	0 " 39	6	20	9 " 64	0	10	9 " 31	6
1939	19	6 " 42	9	18	6 " 43	3	11	6 " 39	9
1940	31	0 " 64	0	22	6 " 60	0	15	6 " 41	0
1941	36	6 " 66	9	26	6 " 71	0	18	3 " 59	0
1942	37	0 " 67	3	26	6 " 90	0	20	6 " 56	6
1943	39	6 " 72	9	33	6 " 140	0	23	6 " 64	0
1944	42	6 " 73	0	33	6 " 145	0	22	0 " 70	0

TABLE No. 2.—BLACKFACE SHEEP.

Year.	Wethers.		Ewes.		Lambs.	
	s.	d.	s.	d.	s.	d.
1819	22	0 to 24	12	0 to 15	8	0 to 9
1820	20	0 " 23	15	6 " 17	7	0 " 8
1821	18	0 " 20	12	0 " 18	6	0 " 7
1822	11	6 " 18	5	6 " 6	4	6 " 0
1823	12	0 " 16	5	0 " 6	4	0 " 5
1824	9	6 " 13	6	0 " 7	4	0 " 5
1825	22	0 " 26	11	0 " 18	6	0 " 9
1826	15	0 " 17	8	0 " 9	4	6 " 6
1827	14	0 " 18	7	0 " 10	6	0 " 7
1828	15	0 " 20	8	0 " 11	5	0 " 7
1829	14	0 " 18	9	0 " 10	6	0 " 7
1830	9	6 " 18	4	0 " 6	4	6 " 6
1831	13	0 " 17	5	0 " 7	5	0 " 6
1832	14	0 " 18	7	0 " 11	6	0 " 7
1833	16	0 " 24	7	6 " 12	6	6 " 9
1834	16	0 " 22	10	0 " 18	6	0 " 8
1835	15	0 " 18	10	0 " 18	7	0 " 8
1836	15	0 " 21	9	0 " 12	8	6 " 11
1837	13	0 " 16	8	0 " 12	8	0 " 9
1838	15	0 " 20	10	0 " 18	not quoted	
1839	15	0 " 22	10	0 " 12	7	0 to 8
1840	15	0 " 22	11	0 " 12	7	0 " 9
1841	16	0 " 20	9	0 " 11	6	0 " 8
1842	14	0 " 19	7	6 " 8	5	6 " 7
1843	not quoted.		4	9 " 6	not quoted.	
1844	15	0 to 21	6	6 " 10	5	0 to 8
1845	14	0 " 23	8	0 " 12	6	0 " 8
1846	13	0 " 24	10	0 " 13	8	0 " 9
1847	20	6 " 25	10	0 " 14	8	6 " 9
1848	20	0 " 24	11	8 " 12	8	6 " 10
1849	not quoted.		not quoted.		7	0 " 7
1850					7	0 " 0
1851	17	6 to 23	9	0 to 12	6	6 " 8
1852	18	6 " 22	9	6 " 12	4	6 " 7
1853	23	0 " 27	14	6 " 16	8	0 " 11
1854	20	0 " 26	11	0 " 16	8	0 " 10
1855	23	6 " 26	14	0 " 16	10	0 " 11
1856	17	0 " 24	10	0 " 20	7	6 " 10
1857	20	0 " 29	10	6 " 15	9	8 " 11
1858	20	0 " 27	9	9 " 18	8	8 " 10
1859	20	0 " 25	10	0 " 14	8	9 " 11
1860	21	0 " 27	11	0 " 16	10	0 " 13
1861	21	0 " 29	12	0 " 22	6	8 " 14
1862	16	9 " 27	12	0 " 13	6	0 " 12
1863	20	0 " 30	13	0 " 16	8	0 " 11
1864	25	0 " 30	15	0 " 19	10	0 " 18
1865	15	6 " 32	15	0 " 25	10	0 " 17
1866	31	6 " 40	20	0 " 36	18	6 " 22
1867	26	0 " 30	14	0 " 22	7	6 " 13
1868	20	0 " 26	10	6 " 13	7	0 " 13
1869	22	0 " 28	11	0 " 14	6	9 " 9
1870	27	0 " 32	13	0 " 22	8	0 " 14
1871	23	0 " 37	13	0 " 23	11	0 " 16
1872	31	6 " 45	18	0 " 32	12	6 " 18
1873	28	0 " 39	16	6 " 27	7	0 " 16
1874	25	0 " 35	13	0 " 20	7	0 " 14
1875	26	6 " 37	15	0 " 21	9	6 " 17
1876	30	0 " 40	19	0 " 24	13	0 " 20
1877	25	0 " 38	18	0 " 25	13	6 " 23
1878	30	0 " 36	17	0 " 23	12	0 " 22
1879	25	0 " 35	16	0 " 24	10	6 " 20
1880	25	0 " 38	16	6 " 22	10	0 " 17
1881	30	0 " 39	15	0 " 23	10	0 " 15
1882	33	0 " 46	20	0 " 28	12	6 " 18
1883	36	0 " 50	24	6 " 33	14	0 " 21
1884	39	0 " 43	19	6 " 28	12	0 " 19
1885	24	0 " 34	13	0 " 22	10	0 " 15
1886	25	0 " 34	12	0 " 22	10	6 " 16
1887	22	0 " 30	11	0 " 19	8	0 " 13
1888	22	0 " 32	13	0 " 24	16	0 " 15
1889	26	0 " 40	13	0 " 29	13	0 " 22

TABLE NO. 2.—BLACKFACE SHEEP—*Continued.*

Year.	Wethers.		Ewes.		Lambs.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1890	24 0	to 37 0	14 0	to 27 0	10 6	to 19 0
1891	21 0	" 37 0	10 0	" 24 0	7 6	" 15 0
1892	16 0	" 28 6	6 0	" 17 0	8 0	" 10 0
1893	21 0	" 37 0	12 0	" 24 0	7 0	" 14 0
1894	20 0	" 37 0	14 6	" 26 6	8 6	" 16 6
1895	23 0	" 41 0	16 0	" 28 6	9 0	" 17 0
1896	19 0	" 35 4	18 0	" 24 0	6 0	" 13 6
1897	21 0	" 36 6	15 0	" 25 6	7 0	" 14 6
1898	22 0	" 37 0	16 0	" 26 6	8 0	" 15 0
1899	20 0	" 33 6	18 0	" 24 0	5 6	" 13 0
1900	23 0	" 36 0	16 0	" 26 6	8 0	" 15 6
1901	20 0	" 35 0	14 0	" 25 6	6 6	" 14 6
1902	18 6	" 34 0	12 0	" 24 0	6 0	" 14 0
1903	21 0	" 36 0	15 0	" 28 0	7 0	" 16 6
1904	23 0	" 38 6	18 0	" 30 0	8 6	" 17 6
1905	21 6	" 37 0	19 0	" 31 0	9 0	" 18 6
1906	23 0	" 38 0	20 0	" 33 0	10 0	" 19 6
1907	21 0	" 33 6	17 0	" 28 0	8 6	" 16 6
1908	19 6	" 30 0	15 0	" 24 6	8 0	" 16 0
1909	17 0	" 28 0	11 6	" 22 0	6 3	" 13 0
1910	21 0	" 32 6	16 0	" 27 6	8 0	" 17 0
1911	19 0	" 29 6	14 0	" 24 0	7 0	" 15 0
1912	21 6	" 32 6	17 0	" 27 6	9 6	" 17 6
1913	24 6	" 36 0	21 0	" 31 0	12 6	" 21 6
1914	27 0	" 38 6	25 0	" 34 6	15 6	" 24 0
1915	31 0	" 42 6	29 0	" 39 6	17 0	" 25 6
1916	33 0	" 46 6	31 0	" 42 0	19 0	" 27 6
1917	36 0	" 51 0	33 0	" 47 0	21 0	" 30 0
1918	41 0	" 56 0	36 0	" 50 0	27 0	" 33 0
1919	44 0	" 62 0	39 0	" 54 0	29 0	" 36 0
1920	46 0	" 66 0	44 0	" 62 0	31 0	" 43 0
1921	32 9	" 60 9	35 3	" 62 6	20 3	" 47 0
1922	40 3	" 63 0	40 6	" 74 0	18 0	" 44 0
1923	46 0	" 65 6	43 0	" 78 0	21 0	" 45 6
1924	46 0	" 68 6	45 6	" 85 0	25 0	" 55 6
1925	36 0	" 60 0	40 0	" 78 0	17 6	" 44 0

Year.	Wethers.		Ewes.		Lambs.			
	s. d.	s. d.	s. d.	s. d.	Wethers.		Ewes.	
1926	30 0	to 54 0	31 0	to 70 0	21 9	to 49 0	19 0	to 50 0
1927	26 6	" 48 0	26 0	" 64 0	17 9	" 40 0	17 6	" 37 9
1928	29 0	" 45 9	24 0	" 57 0	16 6	" 38 6	17 0	" 38 9
1929	29 9	" 46 0	29 0	" 64 0	20 9	" 43 0	18 0	" 37 6
1930	31 6	" 45 0	28 6	" 60 0	20 0	" 45 9	20 0	" 37 6
1931	19 6	" 29 9	15 0	" 38 0	14 3	" 36 9	16 6	" 40 6
1932	12 0	" 19 6	15 0	" 29 0	7 3	" 13 6	7 0	" 14 6
1933	..	..	20 0	" 34 0	12 9	" 19 3	11 0	" 18 3
1934	..	..	22 6	" 44 0	15 0	" 25 3	16 6	" 24 3
1935	..	..	26 0	" 40 0	16 0	" 26 9	10 0	" 23 0
1936	..	..	27 6	" 48 0	18 6	" 37 6	16 0	" 29 0
1937	..	..	32 0	" 54 0	22 6	" 39 3	21 6	" 34 0
1938	..	..	22 0	" 50 0	12 6	" 28 0	10 6	" 25 0
1939	..	..	17 6	" 40 0	12 6	" 24 6	12 0	" 24 0
1940	..	..	22 6	" 50 0	16 0	" 35 3	14 6	" 28 6
1941	..	..	27 6	" 52 6	19 0	" 45 0	21 6	" 46 0
1942	..	..	28 0	" 51 0	16 9	" 39 6	15 0	" 50 6
1943	34 0	to 61 9	32 6	" 63 0	21 9	" 44 0	23 9	" 47 0
1944	37 0	" 70 0	30 6	" 60 0	23 6	" 43 0	24 3	" 59 0

TABLE No. 3.—PRICE OF WOOL, PER STONE OF 24 LB., SINCE 1818.

Year.	Laid Cheviot.		White Cheviot.		Laid Highland.		White Highland.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1818	40 0	to 42 2	..	..	20 0	to 22 6	..	..
1819	21 0	" 22 0	..	..	10 0	" 10 2	..	..
1820	20 0	" 22 0	..	..	9 0	" 10 0	..	..
1821	18 0	" 20 0	..	..	9 0	" 10 0	..	..
1822	12 6	" 14 6	..	..	5 0	" 6 6	..	..
1823	9 0	" 10 6	..	..	5 0	" 5 9	..	..
1824	18 6	" 15 0	..	..	6 0	" 6 2	..	..
1825	10 6	" 22 0	..	..	10 0	" 10 6	..	..
1826	11 0	" 14 0	..	..	5 0	" 5 6	..	..
1827	11 0	" 14 0	..	..	5 6	" 6 9	..	..
1828	8 0	" 11 0	..	..	5 6	" 6 0	..	..
1829	8 6	" 11 0	..	..	4 3	" 0 0	..	..
1830	9 6	" 11 0	..	..	4 6	" 5 0	..	..
1831	17 0	" 20 0	..	..	7 6	" 8 6	..	..
1832	14 0	" 16 0	..	..	7 0	" 7 6	..	..
1833	18 0	" 20 7	..	..	10 0	" 11 0	..	..
1834	21 0	" 24 6	..	..	5 6	" 7 0	..	..
1835	19 0	" 20 6	..	..	9 6	" 10 8	..	..
1836	21 0	" 25 0	..	..	10 0	" 14 0	..	..
1837	12 0	" 14 0	..	..	7 0	" 7 8	..	..
1838	19 0	" 22 6	..	..	6 0	" 10 0	..	..
1839	18 0	" 20 0	..	..	8 0	" 12 0	..	..
1840	15 0	" 0 0	..	..	7 0	" 0 0	..	..
1841	15 0	" 16 9	..	..	6 0	" 7 5	..	..
1842	12 6	" 14 0	..	..	not quoted.	..	..	..
1843	9 0	" 11 6	..	..	5 0	to 6 0	..	..
1844	15 0	" 18 0	..	..	not quoted.	..	..	..
1845	14 6	" 17 6	..	..	7 6	to 8 6	..	..
1846	12 0	" 14 6	..	..	8 0	" 8 6	..	..
1847	12 6	" 14 0	..	..	not quoted.	..	..	..
1848	9 6	" 11 0	..	..	4 9	to 0 0	..	..
1849	12 0	" 16 6	..	..	6 0	" 6 2	..	..
1850	15 0	" 17 6	..	..	8 0	" 8 6	..	..
1851	12 0	" 16 0	..	..	8 0	" 9 2	..	..
1852	18 0	" 15 0	..	..	8 0	" 9 0	..	..
1853	19 0	" 22 0	..	..	11 0	" 12 6	..	..
1854	12 0	" 15 0	..	..	7 6	" 8 6	..	..
1855	14 6	" 19 0	..	..	8 6	" 9 0	..	..
1856	19 0	" 21 6	..	..	11 0	" 0 0	..	..
1857	19 0	" 24 0	..	..	18 0	" 14 2	..	..
1858	15 0	" 17 0	..	..	8 9	" 10 0	..	..
1859	18 6	" 24 0	..	..	10 9	" 11 6	..	..
1860	22 0	" 32 0	37 0	to 38 0	10 0	" 11 8	..	..
1861	19 6	" 27 0	from 30s. upwards	..	not quoted.	..	..	..
1862	18 6	" 26 0	30 0	to 37 0	11 6	to 16 0	..	..
1863	25 6	" 31 0	38 0	" 42 0	15 8	" 17 6	..	..
1864	31 0	" 39 0	47 0	" 54 0	17 6	" 20 0	..	..
1865	23 0	" 30 0	44 0	" 45 0	15 0	" 17 0	..	..
1866	24 0	" 30 0	30 0	" 38 0	14 0	" 16 0	..	..
1867	16 0	" 21 6	not quoted.	..	not quoted.	..	..	..
1868	19 0	" 28 0	28 0	to 32 0	8 6	to 9 0	..	..
1869	18 0	" 26 6	not quoted.	..	8 6	" 10 0	..	..
1870	15 0	" 23 6	25 0	to 26 0	9 6	" 0 0	..	..
1871	20 0	" 28 6	30 0	" 34 6	12 0	" 15 0	..	..
1872	26 0	" 37 6	40 0	" 48 0	18 0	" 21 0	..	..
1873	17 0	" 18 0	34 0	" 40 0	9 0	" 12 0	..	..
1874	18 6	" 26 6	30 0	" 34 0	9 6	" 13 0	..	..
1875	25 0	" 32 0	34 6	" 36 0	12 6	" 16 0	..	..
1876	20 0	" 24 0	30 0	" 34 6	9 6	" 12 0	..	..
1877	20 9	" 26 0	28 0	" 30 0	10 0	" 12 0	..	..
1878	18 9	" 25 0	27 0	" 32 0	8 6	" 11 6	..	..
1879	15 0	" 17 0	prices very low.	..	7 0	" 0 0	..	..
1880	20 0	" 24 0	30 0	to 32 0	10 6	" 11 6	14 0	to 15 0
1881	17 0	" 21 0	27 0	" 30 0	5 0	" 9 6	12 0	" 13 0
1882	14 0	" 18 0	27 6	" 28 0	7 6	" 9 0	13 0	" 14 0
1883	13 0	" 18 0	26 0	" 28 0	6 6	" 8 6	11 6	" 12 6
1884	13 0	" 18 0	26 0	" 28 0	6 6	" 8 6	11 6	" 12 6
1885	12 0	" 17 0	22 6	" 26 0	6 0	" 8 0	11 6	" 12 0
1886	13 0	" 18 0	23 0	" 27 6	6 6	" 8 6	11 6	" 12 0
1887	14 0	" 22 0	23 0	" 28 0	7 0	" 9 0	11 6	" 13 0
1888	13 0	" 20 0	23 0	" 28 0	7 0	" 9 0	11 0	" 12 6

TABLE NO. 3. —PRICE OF WOOL—*Continued.*

Year.	Laid Cheviot.			White Cheviot.			Laid Highland.			White Highland.		
	s.	d.	s. d.	s.	d.	s. d.	s.	d.	s. d.	s.	d.	s. d.
1889	18	0	to 18	0	24	0	to 28	0	7	0	to 9	0
1890	18	0	" 18	0	24	0	" 28	0	7	0	" 9	0
1891	12	6	" 18	0	22	0	" 28	0	7	0	" 9	0
1892	12	0	" 18	0	20	0	" 28	0	7	0	" 8	6
1893	12	0	" 17	0	20	0	" 27	0	7	0	" 8	0
1894	12	0	" 16	0	20	0	" 26	0	7	0	" 8	0
1895	12	0	" 16	0	20	0	" 25	0	7	0	" 8	0
1896	11	0	" 15	0	19	0	" 24	0	7	0	" 8	0
1897	11	0	" 14	0	18	0	" 23	6	7	0	" 8	0
1898	10	0	" 13	0	16	0	" 20	0	7	0	" 8	0
1899	10	0	" 13	0	18	0	" 18	6	7	0	" 8	0
1900	9	9	" 12	0	13	0	" 18	6	6	9	" 7	9
1901	9	0	" 10	0	11	0	" 16	6	5	9	" 6	6
1902	9	0	" 10	0	11	6	" 17	0	6	0	" 6	6
1903	10	0	" 12	0	15	0	" 18	0	7	0	" 8	0
1904	15	0	" 17	0	20	0	" 21	0	9	0	" 10	0
1905	17	0	" 20	0	24	0	" 26	0	10	0	" 11	0
1906	18	0	" 21	0	27	0	" 28	6	11	6	" 13	0
1907			"		22	0	" 24	0	11	0	" 12	6
1908			"		16	0	" 18	0				
1909			"		24	0	" 26	0				
1910			"		25	0	" 30	0				
1911			"		25	0	" 30	0				
1912			"		24	0	" 29	0				
1913			"		25	0	" 30	0				
1914			"		24	0	" 29	0				
1915†			"		42	0	" 46	0				

* No Cheviots smeared now.

† No Highlands smeared now.

‡ These are July prices

PRICE OF WOOL PER STONE OF 24 LB.—Continued.

		CHEVIOT.				HALF-BRED.				BLACK-FACE.		CROSS-BRED (BLACKFACE EWE AND LEICESTER RAM).			
		Hogg.		EWE AND WETHER.		Hogg.		EWE AND WETHER.		Hogg and Wether.		Hogg.		EWE AND WETHER.	
		Washed.	Un- washed.	Washed.	Un- washed.	Washed.	Un- washed.	Washed.	Un- washed.	Hogg	EWE AND WETHER.	Washed.	Un- washed.	Washed.	Un- washed.
		s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1 1916	CAITHNESS & SUTHERLAND	36 6	30 0	33 0	27 6	34 6	28 6	33 0	27 6	28 0	23 0	28 6	25 6	28 6	25 6
1 1917	CAITHNESS & SUTHERLAND	40 0	32 6	34 0	29 0	35 0	29 0	34 6	28 6	25 6	25 6	31 6	28 6	31 6	28 6
1 1918	CAITHNESS & SUTHERLAND	43 6	35 6	39 6	33 0	41 0	33 6	39 6	33 0	27 6	27 0	33 6	30 6	33 6	30 6
1919	CAITHNESS & SUTHERLAND	84 0	70 0	82 0	66 0	82 0	62 0	70 0	58 6	34 0	34 0	46 0	39 0	44 0	38 0
1920	CAITHNESS & SUTHERLAND	86 0	70 0	83 0	66 0	74 0	54 0	65 0	50 0	24 6	24 0	35 0	29 0	34 0	27 0
1921	CAITHNESS & SUTHERLAND	22 0	17 0	19 0	15 0	18 6	14 6	16 0	18 0	9 6	9 6	12 0	10 0	12 0	10 0
1922	CAITHNESS & SUTHERLAND	30 0	25 0	26 0	22 0	26 0	20 0	22 0	18 0	16 0	16 0	16 6	15 0	16 6	15 0
1923	CAITHNESS & SUTHERLAND	41 0	34 0	36 0	30 0	33 0	27 0	30 0	25 0	17 6	17 6	20 0	18 0	20 0	18 0
1924	CAITHNESS & SUTHERLAND	58 0	49 0	53 0	45 0	49 0	40 0	45 0	39 0	25 6	25 6	34 6	30 6	33 0	30 0
1925	CAITHNESS & SUTHERLAND	39 0	34 0	36 0	30 0	33 6	28 6	32 0	27 0	25 6	25 6	26 0	23 6	25 6	23 0
1926	CAITHNESS & SUTHERLAND	35 0	29 0	32 0	28 0	32 0	26 6	28 0	21 6	19 6	19 0	22 6	20 0	22 0	19 6
1927	CAITHNESS & SUTHERLAND	38 0	31 0	35 0	31 0	34 6	29 6	32 0	27 6	24 0	24 0	27 0	25 6	27 0	25 0
1928	Do.	51 0	43 0	48 0	41 0	47 0	40 0	43 0	37 0	24 6	24 6	38 0	31 0	32 0	30 0
1929		52 0	44 0	49 0	42 0	48 0	41 0	44 0	38 0	24 0	24 0	37 0	25 0	36 0	24 0
1930		37 0	32 0	34 0	29 0	34 0	29 0	32 0	27 0	12 0	12 0	17 6	15 6	16 6	15 6
1931		28 0	19 0	22 0	18 0	21 0	17 6	20 0	16 6	11 0	11 0	12 0	10 6	11 6	10 0
1932		16 6	13 6	15 6	13 0	15 0	13 0	15 6	11 6	8 0	8 0	9 0	8 6	8 0	7 6
1933		14 6	11 6	14 0	11 6	12 6	11 6	11 6	9 6	11 6	11 6	12 0	11 0	11 6	11 0
1934		20 0	17 0	19 0	16 0	18 0	16 0	17 0	14 0	10 0	10 0	12 0	11 0	12 0	11 0
1935		21 6	17 6	21 0	17 6	19 0	17 0	17 0	14 0	10 6	10 6	14 0	12 6	14 0	12 6
1936		26 0	21 0	24 6	19 6	21 6	19 0	19 0	17 0	14 0	14 0	17 0	16 0	17 0	16 0
1937		27 0	22 0	25 6	20 0	21 6	19 0	19 0	17 0	26 0	26 0	32 0	29 0	32 0	29 0
1938		39 0	35 0	38 0	33 6	34 6	32 0	34 6	31 6	12 0	12 0	16 0	14 6	16 0	14 6
1939		22 0	19 6	21 6	18 6	21 0	18 6	20 0	18 6	15 0	15 0	21 0	19 0	21 0	19 0
1940		26 0	22 0	25 6	21 6	24 0	21 6	23 6	21 6	25 0	25 0	28 6	26 0	28 6	26 0
1 1941		87 0	30 6	37 0	30 6	33 0	29 6	33 0	29 6	29 0	29 0	33 0	30 0	33 0	30 0
1 1942		42 0	35 6	42 0	35 6	37 6	34 0	37 6	34 0	33 0	33 0	37 0	34 0	37 0	34 0
1 1943		47 0	40 0	47 0	40 0	42 0	38 6	42 0	38 6	38 0	38 0	37 0	34 0	37 0	34 0
1 1944		47 0	40 0	47 0	40 0	42 0	38 6	42 0	38 6	38 0	38 0	37 0	34 0	37 0	34 0

¹ The prices given were prices fixed by Government, and not free market prices.

Premiums awarded by the Society, 1944.

VETERINARY DEPARTMENT.

CLASS EXAMINATIONS, 1944

Silver Medals were awarded to the following —

GLASGOW VETERINARY COLLEGE

Chemistry . . .	Neville J Harrison, Glasgow
Biology	Majorie E Millar, Sandcristead
Senior Anatomy	Gilbert B Young, Glasgow
Junior Anatomy	David M Cracken, Glasgow
Physiology	David Lorne, Errol
Zootechny	George M Urquhart, Glasgow
Pathology	Catherine Mackenzie, Torridon
Hygiene	R S F Campbell, Glasgow
Surgery .	Thomas C Denholm, Glasgow
Medicine (equal)	(Colin C Bannatyne, Brodick Joseph Parker, Penrith
Histology	Henry W Pfaff, Glasgow
Pharmacology	Gilbert B Young, Glasgow
Parasitology	John Burns, Dumbarton

14 Large Silver Medals, £26, 7s 1d

ROYAL (DICK) VETERINARY COLLEGE

Chemistry	J D Phillips, York
Biology	E R Moore, Leeds
Senior Anatomy	G G Gledhill, Ashton under Lyne
Junior Anatomy	L G Donald, Edinburgh
Physiology (equal)	(J M Wilson, Gt. St. Rd J C Wilson, Longdiddry
Zootechny	R C Brown, Low Bentham
Pathology	G Duncan, Blingowrie
Animal Husbandry	J B Wilson, Nantwich
Surgery .	L J P Duncan, Aberdeen
Medicine	L J P Duncan, Aberdeen
Histology	K M Dyce, Edinburgh
Pharmacology	J B Wilson, Nantwich
Parasitology .	G Duncan, Blingowrie

14 Large Silver Medals, £26, 7s 1d

LOCAL GRANTS, &c., 1944.

7 Districts—	Grants of £15 each for Stallions engaged	£105 0 0
	Special Grants : Medals, £20, 14s.	43 6 0
	Medals for Scottish Gardens and Allotments Competition	4 17 4
2 „	Medals for Hoeing, 1943-44	1 15 11
15 „	Medals for Ploughing, 1943-44	16 10 0
Long Service Certificates, £97, 7s. 9d. ; and Silver Medals, £65, 6s. 5d. (1943-44)		162 14 2
		<hr/> £334 3 5 <hr/>

ABSTRACT OF PREMIUMS.

Local Grants	£171 9 3
Long Service Awards	162 14 2
Veterinary Colleges (28 Medals)	52 14 2
	<hr/> £386 17 7 <hr/>

STATE OF THE FUNDS

OF

THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND

As at 30th NOVEMBER 1944

GENERAL FUNDS.

I. BRITISH GOVERNMENT SECURITIES—			
£25,000 8½ per cent War Loan, at 104½	.	.	£26,062 10 0
£20,000 3½ per cent Conversion Loan, at 105½	.	.	21,150 0 0
£2,500 3 per cent Do. do. at 103½	.	.	2,584 7 6
£5,000 3 per cent Funding Loan, at 100½	.	.	5,031 5 0
£1,000 3 per cent Defence Bonds, at 102½	.	.	1,026 5 0
£10,000 3 per cent War Loan, at 102½	.	.	10,218 15 0
£2,300 3 per cent Savings Bonds, 1955-65, at 101½	.	.	2,328 15 0
£3,000 Do. do. 1960-70, at 100½	.	.	3,015 0 0
£2,500 Do. do. 1965-75, at 100½	.	.	2,503 2 6
			<hr/>
			£73,920 0 0
II. HERITABLE BOND—			
£2,500 at Commissioners' Rates	-	.	2,500 0 0
III. RAILWAY DEBENTURE AND PREFERENCE STOCKS—			
£18,000 London and North-Eastern Railway Co. 3 per cent Debenture Stock, at 87½	.	£15,750 0 0	
£12,000 Do. do. 4 per cent do., at 109½	.	13,140 0 0	
£17,000 London Midland and Scottish Railway Co. 4 per cent Debenture Stock, at 110½	.	18,827 10 0	
£1,500 Do. do. 4 per cent Preference Stock, at 79½	.	1,196 5 0	
£2,000 Southern Railway Co. 4 per cent Debenture Stock, at 117½	.	2,350 0 0	
			<hr/>
			51,263 15 0
IV. BANK STOCKS—			
£5,400 Royal Bank of Scotland Stock, at 485 x.d.	.	£26,190 0 0	
£2,300 Bank of England Stock, at 383	.	8,809 0 0	
£1,800 Bank of Scotland Stock, at 73s. 3d.	.	6,573 12 0	
£2,850 Barclays Bank Ltd. "B" Stock, at 78s. 9d.	.	11,217 12 0	
			<hr/>
			52,790 4 0
V. COLONIAL GOVERNMENT STOCKS—			
£2,000 Western Australia 4 per cent Inscribed Stock (1942-62), at 102½	.	£2,050 0 0	
£2,000 New Zealand Government 5 per cent Inscribed Stock (1946), at 104½	.	2,082 10 0	
£1,120 Victorian Government 8½ per cent Consolidated Inscribed Stock (1929-49), at 102½	.	1,143 2 0	
			<hr/>
			5,275 12 0
VI. DEPOSIT RECEIPTS with the Royal Bank of Scotland, Edinburgh			
			1,000 0 0
VII. ESTIMATED VALUE of Building—			
8 Eglinton Crescent, Edinburgh	.	.	5,000 0 0
VIII. ESTIMATED VALUE of Furniture, Paintings, Books, &c.			
	.	.	1,500 0 0
IX. ARREARS OF SUBSCRIPTIONS considered recoverable			
	.	.	134 14 6
X. BALANCES at 30th November 1944			
	.	.	1,128 16 11
			<hr/>
AMOUNT OF GENERAL FUNDS			<hr/>
			£194,513 2 5

SPECIAL FUNDS.

TWEEDDALE GOLD MEDAL FUND—

£805 London and North-Eastern Railway Co. 4 per cent Debenture Stock, at 109½	£662 9 6
£100 3 per cent Local Loans Stock, at 94½	94 15 0
Sum on Deposit Receipt with British Linen Bank	100 17 8
Do. Current Account do.	27 4 0
	<hr/>
	£885 6 2

FIFE AND KINROSS PERPETUAL GOLD CHALLENGE CUP FUND—

£268 London and North-Eastern Railway Co. 3 per cent Debenture Stock, at 87½	£234 10 0
£201 Do. do. 4 per cent First Guaranteed Stock, at 104½	210 0 11
Sum on Deposit Receipt with British Linen Bank	119 6 6
Do. Current Account do.	16 1 6
	<hr/>
	579 18 11

PAISLEY PERPETUAL GOLD CHALLENGE CUP FUND—

£802 London and North-Eastern Railway Co. 3 per cent Debenture Stock, at 87½	£701 15 0
£100 3 per cent Savings Bonds, 1955-65, at 101½	101 5 0
Sum on Deposit Receipt with British Linen Bank	101 0 4
Do. Current Account do.	27 1 2
	<hr/>
	931 1 6

RENFREWSHIRE PERPETUAL GOLD CHALLENGE CUP FUND—

£668 London and North-Eastern Railway Co. 3 per cent Debenture Stock, at 87½	£584 10 0
£100 3 per cent Savings Bonds, 1955-65, at 101½	101 5 0
Sum on Deposit Receipt with British Linen Bank	92 18 11
Do. Current Account do.	23 0 10
	<hr/>
	801 14 9

WILLIAM TAYLOR MEMORIAL PRIZE FUND—

£401 London and North-Eastern Railway Co. 3 per cent Debenture Stock, at 87½	£350 17 6
£100 3 per cent Savings Bonds, 1955-65, at 101½	101 5 0
Sum on Deposit Receipt with British Linen Bank	73 0 9
Do. Current Account do.	15 0 8
	<hr/>
	540 3 11

WILLIAM DUTHIE PERPETUAL SILVER CHALLENGE CUP FUND—

£260 2½ per cent Consolidated Stock, at 82	£213 4 0
Sum on Deposit Receipt with British Linen Bank	26 2 3
Do. Current Account do.	6 10 0
	<hr/>
	245 16 3

THE JAMES ARCHIBALD PRIZE—

£612, 1s. 6d. 3½ per cent War Loan, at 104½	£638 1 9
Sum on Deposit Receipt with Royal Bank of Scotland	75 11 6
Do. Current Account do.	21 8 4
	<hr/>
	735 1 7

KINMONTH GOLD QUACH FUND—

£46, 13s. 6d. 3½ per cent War Loan, at 104½	£48 18 2
Sum on Deposit Receipt with British Linen Bank	4 15 0
Do. Current Account do.	3 5 4
	<hr/>
	56 13 6

J. DUTHIE WEBSTER FUND—

Sum on Deposit Receipt with Royal Bank of Scotland	900 0 0
	<hr/>

AMOUNT OF SPECIAL FUNDS . . . £5,675 16 7

EDINBURGH, 10th January 1945.—As Auditor of the Highland and Agricultural Society of Scotland, I have examined the Securities for the Investments as detailed in the above State of the Funds and have found them in order. The Titles to the Heritable Estate and the Bond for Sum lent on Heritable Security are certified by the Society's Law Agents to be in order.

GEO. JAMES GREGOR, C.A.

HOME, Treasurer.

JAMES R. LUMSDEN, Chairman of Board of Directors.

ABSTRACT of the ACCOUNTS of the HIGHLAND and

CHARGE.

1. BALANCES at 30th November 1943	£375 15 2	
2. ARREARS of Subscriptions outstanding at 30th November 1943	£178 19 6	
Whereof due by Members who have compounded for life, and whose arrears are thereby extinguished	31 14 0	147 5 6
3. INTEREST AND DIVIDENDS —		
(1) Interest—		
On Heritable Bond, less Income-tax	£40 12 6	
On Railway Debenture and Preference Stocks, do.	867 0 8	
On Colonial Government Stocks, do.	109 12 0	
On British Government Stocks, do.	1,586 1 4	
On Mortgage, do.	100 0 0	
On Temporary Loans, do.	7 12 6	
On Deposit Receipts	4 12 2	
	£2,715 11 2	
(2) Dividends on Bank Stocks, less Income-tax	886 7 10	3,601 19 0
4. SUBSCRIPTIONS—		
Annual Subscriptions	£1,283 2 6	
Life Subscriptions	1,605 9 0	2,888 11 6
5. 'TRANSACTIONS'—Miscellaneous Sales and other Receipts	37 7 3	
6. INCOME-TAX repaid for year to 5th April 1944	2,686 12 8	
7. N. D. D. EXAMINATION at Auchincruive, 1943—Refund of Expenses	160 13 7	
8. INVESTMENTS realised	7,016 5 4	
9. UPLIFTED from Deposit Receipt	1,000 0 0	
10. TEMPORARY Loan repaid	2,000 0 0	
SUM OF CHARGE	£19,914 10 0	

EDINBURGH, 10th January 1945.—As Auditor of the Highland and Agricultural Society for the year ending 30th November 1944 and have found them to be Accounts I have prepared an Account of Charge and Discharge of the Intromissions 1944, of which the above is an Abstract.

AGRICULTURAL SOCIETY of SCOTLAND for Year 1943-1944.

DISCHARGE.

1 ESTABLISHMENT EXPENSES—		
Salaries and Wages and Allowance for Cleaning		£3,265 9 4
Allowance to Miss Cowie		100 0 0
Few duty, £14, 11s 8d, Rates and Taxes, £109, 14s 0d		124 5 8
Coal, Gas, and Electric Light		79 4 1
Insurances, £16, 8s 1d, War Damage Insurance (Business) £36, 8s 6d, Special Annuity Premium, £21, 3s 9d Superannuation Scheme, £34 2s 8d Telephone and Telegrams, £62, 14s 9d, Repairs and Furnishings £55 5s 1d		968 17 10
		£3,982 16 11
2 FEE to Auditor of Accounts for 1942-1943		120 0 0
3 EDUCATION—N D A Examinations, 1944		95 18 7
4 CHEMICAL DEPARTMENT—		
Fee to Chemist	£100 0 0	
Analyses for Members and Expenses	183 12 0	
		283 12 0
5 VETERINARY DEPARTMENT—Medals to Students		52 14 2
6 DAIRY DEPARTMENT—N D D Examination, 1943		82 11 5
7 DAIRY DEPARTMENT, 1944—		
Expenses of N D D Examination held at Auchincruive	£216 7 10	
Less Entry Fees	147 0 6	
		129 7 4
8 IMPLEMENT Demonstration		36s 5 0
9 SOCIETY'S 'TRANSACTIONS'		1,118 8 8
10 ORDINARY Printing, £95 4s 8d, Advertising, £41, 1s 3d Stationery, Books, &c, £79, 10s 6d, Postages and Receipt Stamps, £98, 0s 6d		314 2 0
11 RETIREMENT Allowance to Professor Stanfield, Consulting Engineer		150 0 0
12 MISCELLANEOUS Payments		243 18 4
13 GRANTS to Local Societies, 1943		233 18 6
14 CERTIFICATES and Medals for Long Service		176 16 7
15 SPECIAL GRANTS—		
Animal Diseases Research Association £200, Glasgow Veterinary College, £150 Royal Scottish Agricultural Benevolent Institution £100 Scottish Agricultural Organisation Society £100, Scottish Red Cross Agriculture Fund £237, 6s 5d, other Grants £97, 2s 0d		879 8 5
16 PRIZES, in connection with Show Plant &c		74 12 9
17 INVESTMENTS made		9,688 11 5
18 PLACED on Deposit Receipt		500 0 0
19 ARREARS removed from Subscription List at 30th November 1944		52 16 6
20 ARREARS of Subscriptions outstanding at 30th November 1941		184 14 6
21 BALANCES at 30th November 1944—		
On Account Current with Royal Bank of Scotland—		
Edinburgh Account	£1,052 12 10	
In hands of Secretary	76 4 1	
		1,128 16 11
SUM OF DISCHARGE		<u>£19 914 10 0</u>

Society of Scotland, I beg to report that I have examined the Books and Accounts correctly stated and sufficiently vouched and instructed From the Books and of the Treasurer with the Funds of the Society for the year ending 30th November
 GEO JAMES GREGOR, C A

HOME Treasurer

JAMES R LUMSDEN, Chairman of Board of Directors.

ABSTRACT of the ACCOUNTS of the CHARGE.

I. FUNDS at 30th November 1943—

£3,193 London and North-Eastern Railway Company 3 per cent Debenture Stock	£2,650 0 0
£5,551, 16s. 3d. 3½ per cent Conversion Stock	4,216 18 2
£500 Queensland 3½ per cent Inscribed Stock, 1950-70	450 1 0
£412 London Midland and Scottish Railway Company 4 per cent Debenture Stock	611 10 6
£190 London Midland and Scottish Railway Company 4 per cent Guaranteed Stock	259 1 11
£400 3 per cent Savings Bonds, "A," 1955-65	400 0 0
	<u>£8,587 11 7</u>

BALANCES with Royal Bank of Scotland—

On Account Current	£51 3 11
On Deposit Receipt	315 0 0
	<u>366 3 11</u>
	<u>£8,953 15 6</u>

II. INTEREST ON INVESTMENTS—

On £3,193 London and North-Eastern Railway Company 3 per cent Debenture Stock, for year to 30th June 1944	£95 15 10
Less tax	47 17 11

£47 17 11

On £5,551, 16s. 3d. 3½ per cent Conversion Stock, for year to 1st October 1944	£194 6 2
Less tax	97 3 0
	<u>97 3 2</u>

On £500 Queensland 3½ per cent Inscribed Stock, 1950-70, for year to 1st July 1944	£17 10 0
Less tax	8 15 0
	<u>8 15 0</u>

On £412 London Midland and Scottish Rail- way Company 4 per cent Debenture Stock, for year to 30th June 1944	£16 9 6
Less tax	8 4 9
	<u>8 4 9</u>

On £190 London Midland and Scottish Rail- way Company 4 per cent Guaranteed Stock, for year to 30th June 1944	£7 12 0
Less tax	3 16 0
	<u>3 16 0</u>

On £400 3 per cent Savings Bonds, "A," 1955-65, for year to 15th August 1944	£12 0 0
Less tax	6 0 0
	<u>6 0 0</u>

171 16 10

III. INCOME-TAX repaid for year to 5th April 1944	171 16 8
SUM OF CHARGE	<u><u>£9,297 9 0</u></u>

EDINBURGH, 10th January 1945.

ARGYLL NAVAL FUND for the Year 1943-1944.

DISCHARGE.

I. ALLOWANCES to four Recipients as follows:—

1 at £50	£50 0 0	
2 at £30 each	60 0 0	
1 at £20	20 0 0	
	<hr/>	£130 0 0

II. EXPENSES of Administration—

Advertising Vacancies on List of Beneficiaries	11 15 6
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III. FUNDS at 30th November 1944—

£3,198 London and North-Eastern Railway Company 3 per cent Debenture Stock	£2,650 0 0
£5,551, 16s. 3d. 3½ per cent Conversion Stock	4,216 18 2
£500 Queensland 3½ per cent Inscribed Stock, 1950-70	450 1 0
£412 London Midland and Scottish Railway Company 4 per cent Debenture Stock	611 10 6
£190 London Midland and Scottish Railway Company 4 per cent Guaranteed Stock	259 1 11
£400 3 per cent Savings Bonds, "A," 1955-65	400 0 0
	<hr/>
	£8,587 11 7

Note.—The above Funds are entered at cost price. The market value at 30th November 1944 was £10,235, 5s. 8d.

Balances with Royal Bank of Scotland—

On Account Current	£51 1 11	
On Deposit Receipt	515 0 0	
	<hr/>	568 1 11
		<hr/>
		9,155 13 6
		<hr/>
SUM OF DISCHARGE		£9,297 9 0
		<hr/>

HOME, *Treasurer.*

JAMES R. LUMSDEN, *Chairman of Board of Directors.*

GEO. JAMES GREGOR, C.A., *Auditor.*

VIEW OF RECEIPTS AND PAYMENTS for Year 1943-1944.

RECEIPTS.

INTEREST AND DIVIDENDS	£3,601 19 0
INCOME TAX REPAYED for year to 5th April 1944	2,686 12 8
	<hr/>
	£6,288 11 8
ANNUAL SUBSCRIPTIONS AND ARREARS received	1,242 17 0
	<hr/>
	£7,531 8 8

PAYMENTS.

ESTABLISHMENT EXPENSES (see page 5)	£3,932 16 11
FEE TO AUDITOR for 1942-1943	120 0 0
CHEMICAL DEPARTMENT	233 12 0
VETERINARY DEPARTMENT	52 14 2
EDUCATION	147 3 9
RETIRING ALLOWANCE TO CONSULTING ENGINEER	150 0 0
SOCIETY'S 'TRANSACTIONS'	1,081 1 5
ORDINARY Printing, Stationery, Advertising, and Miscellaneous Accounts	638 13 1
GRANTS TO LOCAL SOCIETIES, &c.	410 10 1
IMPLEMENT DEMONSTRATIONS	365 5 0
	<hr/>
	£7,131 16 5
<i>Extraordinary Expenditure—</i>	
Special Grants (see page 5)	879 8 5
	<hr/>
	8,011 4 10
. DEFICIT	£479 16 2
<i>Extraordinary Income—</i>	
Life Subscriptions	1,605 9 0
	<hr/>
EXCESS OF RECEIPTS	£1,125 12 10
	<hr/>

HOME, Treasurer.

JAMES R. LUMSDEN, Chairman of Board of Directors.

GEO. JAMES GREGOR, C.A. Auditor.

EDINBURGH, 10th January 1945.

PROCEEDINGS AT BOARD MEETINGS.

MEETING OF DIRECTORS, 5TH APRIL 1944.

Major R. F. BREBNER, C.B.E., The Leuchold, Dalmeny House, Edinburgh, in the Chair.

Present.—Ordinary Directors—Mr R. Scott Aiton; Major R. F. Brebner, C.B.E.; Mr William Brown; Mr W. J. Campbell; The Earl of Elgin and Kincardine, K.T., C.M.G.; Mr J. E. Kerr; Mr John Kerr; Mr James R. Lumsden; Mr Robert W. Meikle; Mr A. W. Montgomerie; Mr Alexander Murdoch; Mr James Paton; Sir Joshua Ross-Taylor; Mr W. D. Simpson; Mr John P. Sleigh; Mr J. Fied Sproat; Mr Matthew Templeton; Mr James Withers; Mr James Wyllie. *Extraordinary Directors*—Mr Alexander Clark; Mr James Durno; Mr Peter Gordon; Mr George Grant; Mr Thomas Hutchison; Mr James Kilpatrick; Mr Finlay MacGillivray. *Treasurer*—The Earl of Home, K.T.

Science.

A Minute of Meeting of Science Committee, dated 2nd February, was submitted.

The Minute dealt with the following matter:—

Licensing of Boars.—The Committee had considered a letter, dated 13th January, from the Department of Agriculture for Scotland, in which it was stated that the question of introducing legislation to provide for the licensing of boars was being considered by the Ministry of Agriculture and Fisheries and by the Department. The proposal was that the Improvement of Live Stock (Licensing of Bulls) Act, 1931, should be extended to boars. The Department asked for an expression of the Society's views on the desirability of introducing a scheme for the licensing of boars in Great Britain. It was added that the Department understood that the opinion of interested Societies in England was likely to be in favour of the proposal. The Committee decided that a reply be sent to the effect that the Directors of the Society were in favour of the proposal.

The Minute was approved, and the action of the Science Committee with regard to the licensing of boars was homologated.

Committee on Agricultural Education in Scotland.

A letter was submitted from the Secretary of the Committee on Agricultural Education in Scotland, recently appointed by the Secretary of State for Scotland, with the following terms of reference: "To inquire into the organisation, staffing, curricula, and external services of Agricultural Colleges in Scotland and the relationship of the Colleges to the Universities and to the Research Institutes, and to make recommendations." The letter contained an invitation to the Society to submit any statement it might desire to put before the Committee on the subject of their inquiries, and also to nominate one or two representatives to speak to the evidence and elucidate any points that might be necessary.

On the motion of the Chairman, the matter was remitted to the Education Committee, with powers, to prepare a Statement of Evidence and appoint representatives to appear before the Committee.

Post-war Agricultural Policy.

A letter was submitted from the Royal Agricultural Society, dated 17th February, inviting the Society to appoint two representatives to a Conference on Post-war Agricultural Policy to be held in London on 12th April.

The Chairman pointed out that the Department of Agriculture for Scotland was at present holding Conferences with various agricultural bodies as to how far agreement could be reached in regard to certain points connected with Post-war Agriculture. In view of these Conferences, he thought that the time was not opportune for sending representatives to a Conference in London.

It was unanimously decided that no representatives be sent on this occasion.

Inspection of Growing Crops of Potatoes.

Mr James Paton, Kirkness, Glencraig, and Mr W. D. Simpson, Highfield, North Berwick, submitted a Report on the proceedings at a Conference in connection with the Scheme for the Inspection of Growing Crops of Potatoes, held at St Andrew's House, Edinburgh, on 3rd February.

In speaking to the Report, Mr Paton referred to the new designations which were to be used in future. He added that this was the first time that the authorities had decided that they would not grant a certificate to potatoes visibly infected with eelworm.

The Chairman thanked Mr Paton and Mr Simpson for their Report. He said the Report showed that the position with regard to Scottish Seed Potatoes was very satisfactory.

Demonstration and Exhibition of New Implements.

Sir Joshua Ross-Taylor, Mungoswells, Duns, Convener of the Implements Committee, submitted a Report on behalf of the Special Committee appointed on 5th January. A suitable site for the Demonstration of Implements adapted for spring work had been placed at the disposal of the Society through the courtesy of Mr Thomas A. Wedderspoon, Castleton, Eassie, Angus. Mr Wedderspoon had placed at their disposal 50 acres of plough-land for demonstration purposes, and a large grass field for exhibition purposes and for use as a car park. Rules and regulations had been drawn up and entries invited by advertisement in the Press. A large and representative entry had been received. The date of the Demonstration had been fixed for the 19th and 20th April.

Sir Joshua further stated that Mr C. Davies of the Machinery Division of the Ministry of Agriculture had, on the invitation of the Committee, been released by the Ministry in order that he might undertake the technical supervision of the Demonstrations, and supply a Report thereon for publication in the 'Transactions.' British Restaurants, Dundee, had kindly undertaken to provide snack luncheons and teas on the ground. Sleeping quarters for exhibitors' drivers and workmen would be available in the Eassie and Nevay W.R.I. Hall at Eassie. Lady Cayzer, Deputy President of the Angus Branch of the Red Cross Society, had kindly undertaken to arrange for a collection to be taken by V.A.D.s in aid of the Scottish Red Cross Agriculture Fund.

The Chairman thanked Sir Joshua Ross-Taylor for the Report. He also expressed the Society's thanks to Mr Wedderspoon and also to Mr Thomas Hutchison for all that they had done in furthering the arrangements for the Demonstration.

Farm Buildings.

A Minute of Meeting of the Special Committee on Farm Buildings, appointed by the Directors on 3rd November, was submitted.

The Minute stated that the Committee had prepared a Memorandum of Evidence to be submitted on behalf of the Society to the Scottish Committee on Farm Buildings appointed by the Secretary of State for Scotland to consider and make recommendations regarding the lay-out, design, and construction of farm buildings after the war. The Memorandum was forwarded to the Secretary of the Scottish Committee on 16th February. The Special Committee had further nominated the following members to appear before the Scottish Committee in support of the Evidence, if such appearance were desired: Mr J. W. Alexander, M.V.O., Mr James Paton, and Mr W. D. Simpson.

The Chairman, in moving approval, said the Memorandum was founded on a Memorandum which had been submitted by the Land Agents' Society. The Committee took that as the basis of their Memorandum, and made certain practical and, he thought, useful suggestions.

Mr W. J. Campbell, Edinburgh, said he thought they should direct attention in the Memorandum to the value of Caithness flagstones as a flooring material for dairy byres. These would provide a floor which was impervious to water and retained heat. For cheapness, durability, cleanliness, and adaptability for many purposes, Caithness flagstones had no equal. He thought that a statement on this matter should be added to the Memorandum, and thus bring it to the notice of farmers and architects designing farm buildings.

The Chairman said that Mr Campbell's statement would be brought before the Secretary of State's Committee by the Society's representatives if they were called before the Committee.

Animal Diseases Research Association.

An application was submitted from the Animal Diseases Research Association for a renewal of the grant of £200 for the current year.

On the recommendation of the Finance Committee, it was agreed that the grant be renewed.

Glasgow Veterinary College.

An application from the Glasgow Veterinary College was submitted, asking for a renewal of the grant of £150 for the current year.

On the recommendation of the Finance Committee, it was agreed that the grant be renewed.

Finance.

A Minute of Meeting of Finance Committee, dated 5th April, was submitted and approved.

The Minute dealt with the following matters:—

Scottish Red Cross Agriculture Fund.—The Committee recommended that the expenses incurred in connection with the activities of the Scottish Red Cross Agriculture Fund Committee during its fourth year, amounting to a sum of £232, 6s. 5d., be defrayed by the Society.

Glasgow and West of Scotland S.P.C.A.—It was recommended that a grant of £10 be again given to the Glasgow and West of Scotland Society for the Prevention of Cruelty to Animals for the current year.

MEETING OF DIRECTORS, 7TH JUNE 1944.

Major R. F. BREBNER, C.B.E., The Leuchold, Dalmeny House, Edinburgh, in the Chair.

Present.—Ordinary Directors—Mr R. Scott Aiton; Mr J. W. Alexander, M.V.O.; Major R. F. Brebner, C.B.E.; Mr W. J. Campbell; Captain James Craig; The Earl of Elgin and Kincardine, K.T., C.M.G.; Mr Alexander Forbes; Mr J. E. Kerr; Mr William H. Lawson; Mr James R. Lumsden; Mr Robert W. Meikle; Mr A. W. Montgomerie; Mr James Paton; Sir Joshua Ross-Taylor; Mr G. H. Russell; Mr W. D. Simpson. *Extraordinary Directors*—Mr Alexander Clark; Mr James Durno; Mr Peter Gordon; Mr George Grant; Mr Thomas Hutchison; Mr Finlay MacGillivray. *Treasurer*—The Earl of Home, K.T.

The late Mr Thomas M'Lay, Stirling.

Before proceeding with the business of the Meeting, the Chairman referred, with very deep regret, to the death of Mr Thomas M'Lay, Dunvegan, Causewayhead, Stirling. Mr M'Lay, he said, joined the Society in 1920, and was appointed an Extraordinary Director in 1937, on the occasion of the Show at Alloa. In 1939 he was elected as an Ordinary Director representing the Stirling Show Division, in which capacity he served for four years, his term of office expiring in October 1943.

In the course of his business as an Insurance Inspector Mr M'Lay was well known to the agricultural community throughout a wide area, and by all he was held in high esteem. He had a sound knowledge of farming and farm live stock, being particularly interested in Clydesdale horses, and as a Director rendered valuable services in connection with the Show at Alloa. He took a keen interest in all the affairs of the Society, and was particularly helpful in adding to the strength of the Society by securing new members.

A Minute of regret and sympathy was submitted and adopted, the members present upstanding, and the Secretary was instructed to forward a copy thereof to the widow of the deceased.

Illness of Mr Alexander Murdoch.

The Chairman made sympathetic reference to the illness from which Mr Murdoch had recently suffered, and expressed the regret of the Meeting at his absence.

It was agreed to instruct the Secretary to write to Mr Murdoch, conveying the best wishes of the Board for his speedy and complete recovery.

Vacancy on Board.

On behalf of the Ordinary Directors in the Border Show Division, Sir Joshua Ross-Taylor, Mungoswells, Duns, moved that Captain R. J. Thomson of Kaimess, West Linton, be nominated at the Half-yearly General Meeting that afternoon as an Ordinary Director to fill the vacancy caused by the death of the late Major R. W. Sharpe.

The motion was seconded by Mr R. Scott Aiton, M.C., Legerwood, Earlston, and unanimously agreed to.

Scottish Red Cross Agriculture Fund.

The Chairman referred to the Report on the activities of the Scottish Red Cross Agriculture Fund Committee during its fourth year—17th April 1943 to 16th April 1944—which had been circulated to Members of the Board. The result, he said, reflected great credit on the agricultural community, and he hoped all would increase their efforts on behalf of the Fund during the coming year. (For full details, see Report of Half-yearly General Meeting of 7th June 1944.)

Grants Confirmed.

On the motion of the Treasurer, the Earl of Home, K.T., the following proposed grants, approved of at last Meeting, were confirmed:—

Animal Diseases Research Association.—£200 for the current year.

Glasgow Veterinary College.—£150 for the current year.

"Duthie" Prize for Shorthorn Cattle.

A letter was submitted, dated 24th April 1944, from Messrs Peterkin & Duncans, Advocates, Aberdeen, intimating that the late Mr J. Duthie Webster, Collym Cottage, Tarnes, who died on 4th April, by his last will and testament, left a bequest in the following terms: "To the Highland and Agricultural Society of Scotland the sum of One Thousand Pounds Stg. to be funded and the income to be used for a 'Duthie' Prize Fund for Shorthorn Cattle at the Society's Annual Show."

The Chairman said he was sure they were all interested to know of this bequest by Mr Duthie Webster, which was going to keep the world-famous name in the remembrance of agriculturists. When the bequest was received the Directors would take into consideration what form the Prize should take.

Demonstration and Exhibition of New Implements.

A Minute of Meeting of Special Committee, dated 6th June, was submitted and approved.

Sir Joshua Ross-Taylor, in submitting the Minute, said that a full report on the recent Demonstration and Exhibition at Castleton, Eassie, would be submitted to the General Meeting that afternoon. He referred to the great services rendered by Mr T. A. Wedderspoon, without whose valuable help and co-operation, he said, the Demonstration could not have been such a success. He also expressed the thanks of the Directors to Mr Thomas Hutchison for much valuable assistance.

Sir Joshua then referred to the proposed forthcoming Demonstration at harvest-time, when they hoped to have demonstrations of Combined Harvesters, Pick-up Balers, Binders, Portable Threshing Mills, Power Mowers, Potato Harvesters, Beet Harvesters, and other New Implements suitable for autumn use. New Implements not suitable for autumn work could be entered for exhibition only.

The site of the Demonstration had been fixed for Almond Hill, Kirkliston, on fields kindly placed at the disposal of the Society by Mr William Allison. The date had not been definitely fixed, but the Demonstration would take place on two days either in the last week of August or in the first week of September.

Committee on Agricultural Education in Scotland.

Sir Joshua Ross-Taylor reported that the representatives of the Society were to appear before Lord Alness's Committee on Agricultural Education in Scotland, at St Andrew's House, next day, when they would speak to a Memorandum of Evidence which had been submitted on behalf of the Society. The three Agricultural Colleges in Scotland each had its own proposals for reorganisation, and it was not possible for an outside body like the Highland and Agricultural Society to do other than generalise on the matters under investigation.

In reply to a question by Mr W. J. Campbell, Sir Joshua said that, with regard to the relationship between the Edinburgh and East of Scotland College and the University, they were proposing no change. Some of the teaching was done in the University, and the rest—the more practical work—was done in the Agricultural College, and they thought that this system should continue.

Argyll Naval Fund

A Minute of Meeting of Argyll Naval Fund Committee, dated 6th June, was read and approved.

The Minute stated that the Committee had revised the Regulations, the principal change being that the annual allowance to beneficiaries would be increased from £40 to £60.

Finance

A Minute of Meeting of Committee, dated 7th June, was submitted and approved.

The Minute dealt with the following matters—

Edinburgh Highland Reel and Strathspey Society—It was recommended that the grant of £50, together with the additional grant of £25 given during the past four years, be renewed for the current year.

Staff Salaries—It was agreed to recommend that the salary of Mr John Watt, Second Clerk, be increased from £325 to £350 as from 1st June. Mr Watt would, in addition, continue to receive the war bonus of £50 per annum.

Presentation to Mr T. A. Widderspoon—It was recommended that authority be given for an expenditure of approximately £25 in purchasing a piece of Plate, or other article, to be presented to Mr T. A. Widderspoon, Castleton, Easing, in recognition of the valuable services which he rendered to the Society in connection with the recent Demonstration and Exhibition of New Implements.

MEETING OF DIRECTORS, 1st NOVEMBER 1944

Majors R. I. BRIDGEMAN, C.B.E., The Leuchbold Dining House, Edinburgh and thereafter Mr JAMES R. LUMSDEN of Arden, Dumfriesshire, in the Chair.

Present—Ordinary Directors—Mr R. Scott Aiton, Mr J. W. Alexander, M.V.O., Mr William Allison, Mr William Brown, Mr W. J. Campbell, Mr James Clark, Mr James Dunn, The Earl of Elgin and Kincardine, K.T., C.M.G., Mr Alexander Forbes, Mr J. E. Kerr, Mr John Kerr, Mr William H. Lawson, Mr William Montgomery, Mr John Niven, Mr J. N. Reid, Captain Ian S. Robertson, Sir Joshua Ross Taylor, Mr W. D. Simpson, Mr John P. Sleight, Mr Matthew Templeton, Captain R. J. Thomson, Mr Francis W. Walker, Mr James Withier. *Extraordinary Directors*—Major R. F. Brebner, C.B.E., Mr George Grant, Mr Thomas Hutchison, Mr James Kilpatrick, Mr James R. Lumsden, Mr Finlay MacGillivray, Mr Alexander Murdoch. *Treasurer*—The Earl of Home, K.T.

The late Lord Polwarth

Before proceeding with the business of the Meeting, the Chairman referred, with very deep regret, to the death of Lord Polwarth, C.B.E., V.D., LL.D., a former Director of the Society. Lord Polwarth, he said, joined the Society and was elected a Director in the year 1889, serving for a period of twelve years up to 1901. His association with the Board as a Director, therefore, terminated over forty years ago. He was, however, elected a Vice President in 1939 on the occasion of the last Show held by the Society in Edinburgh.

It was somewhat difficult, after such a lapse of time, to speak of Lord Polwarth's work for the Society, although it could be said that he took a deep interest in agriculture and rendered valuable service to the Society as a Director. In that respect he followed in the footsteps of his father, the 8th Baron, who not only served the Society as a Director, but occupied the offices of President and Vice President with great acceptance. The family tradition was also carried on by Lord Polwarth's son, the late Master of Polwarth, who gave valued service to the Society as a Director for a period of sixteen years up to the date of his death in 1942.

Lord Polwarth gave long and distinguished service in many spheres of public duty, both in the County of East Lothian and throughout a much wider area. His valuable work on behalf of the Church of Scotland and in connection with various Youth Organisations would long be remembered. Though he died in the fullness of years, his loss was none the less deeply regretted by a generation who were facing a future full of uncertainties.

A Minute of regret and sympathy was submitted and adopted, the members present upstanding, and the Secretary was instructed to forward a copy to the family of the deceased.

The late Mr Murray Little

The Chairman also referred, with deep regret to the death of another former member of the Board, Mr Murray Little, Summerhill, Annan. Mr Murray Little, he said, joined the Society in 1888 and served as a Director from 1914 to 1920, and again for one year in 1930 on the occasion of the Dumfries Show of that year.

Mr Murray Little was by profession a solicitor, and was Town Clerk of Annan. He was keenly interested in agriculture, was Secretary of the Lower Annandale Agricultural Society, and was Factor on the Marquis of Queensberry's Kimmount Estate, besides holding other appointments.

His knowledge of agricultural law and questions relating to land tenure rendered his services of much value to the Society. His kindly and agreeable disposition earned the high regard and esteem of the members of the Board with whom he was associated. His death was mourned by a wide circle of friends, by whom his memory would long be cherished.

A Minute of regret and sympathy was submitted and adopted, the members present upstanding, and the Secretary was instructed to forward a copy to the widow of the deceased.

The late Mr Falconer L. Wallace of Candacraig

The Chairman then referred to the death under extremely tragic circumstances of Mr Falconer L. Wallace of Candacraig. Mr Wallace, he said, had been a member of the Society for over thirty years and served as an Ordinary Director for seven years—from 1923 to 1926 and from 1930 to 1933. He also occupied the office of Vice President in 1927-28.

Mr Wallace was one of the most prominent agriculturists in the North East of Scotland, and was a noted breeder of pedigree farm stock. He was the owner of select herds of Shorthorn and Aberdeen Angus cattle and had, in addition interests in Clydesdale horses and Blackface sheep. Animals bred by him won highest honours at the Society's Annual Shows.

His deep concern for the welfare of farm live stock was perhaps most evident through the great interest which he took in the Animal Diseases Research Association. He gave generous support to that body and occupied the office of President of the Board of Directors for many years up till the date of his death.

His kindly and courteous personality and generous disposition earned for Mr Falconer Wallace the esteem and regard of all with whom he was associated. His death, which was deeply mourned by a wide circle of friends, was a loss to agriculture in Scotland.

A Minute of regret and sympathy was submitted and adopted, the members present upstanding, and the Secretary was instructed to forward a copy to the family of the deceased.

Chairman of the Board for 1944-45

The Chairman, Major R. T. Brebner, C.B.E., The Leuchhold Dalmany, moved that Mr James R. Lumsden of Arden, Dumbartonshire, be elected Chairman of the Board of Directors for the ensuing year.

Mr Alexander Murdoch, East Hallside Cambuslang seconded, and the motion was unanimously adopted.

Mr Lumsden, on taking the Chair, thanked the Directors for the honour they had done him.

Mr Lumsden then moved that a very hearty vote of thanks be accorded to Major Brebner, who he said, had conducted the business of the Society with great acceptance during the past five years.

Major Brebner, in reply, thanked the members of the Board for the loyal support which they had extended to him throughout his term of office.

Resignation of Honorary Secretary

A letter was submitted from Colonel F. J. Cairuthers, C.B., of Dormont, Lockerbie, resigning the office of Honorary Secretary of the Society.

Major R. T. Brebner, in formally moving acceptance of the resignation, said he was sure he expressed the feelings of every member of the Board when he said that they accepted the resignation with the very deepest regret. Colonel Cairuthers had been a Director of the Society since 1907, and had thus sat on the Board for thirty seven years. He was Chairman of the Board in 1925-26 and 1926-27, and a Vice President of the Society in 1915, 1916, and 1938. He was Convener of the Education Committee for twenty years and for over seventeen years Convener of the Publications Committee.

He represented the Society on the National Agricultural and National Dairy Examination Boards and was Chairman of these Boards on several occasions.

Colonel Carruthers was appointed Honorary Secretary in 1929. Probably no one had rendered more valuable service to the Society. He was always deeply concerned about the interests of the Society and everything he did and the opinions which he expressed at the Board Meetings were what he considered to be in the best interests of the Society.

In conclusion Major Brebner said he was sure it would be their wish that they record in the Minutes their high appreciation of all the services which Colonel Carruthers had rendered to the Society, and instruct the Secretary to convey to him their grateful thanks for all he had done and their very best wishes for his health and happiness in the future.

The motion was unanimously adopted.

Major Brebner then moved that it be remitted to the Office bearers Committee to bring forward a nomination for the office of Honorary Secretary at next Meeting. This was agreed to.

Agricultural Co operation in Scotland

A letter was submitted from the Scottish Agricultural Organisation Society, Ltd, intimating that it was proposed to hold a Conference of affiliated Societies and contributors to S.A.O.S. Funds in Edinburgh on Thursday, 23rd November 1944. The principal business of the Meeting would be to discuss and advise on the post war organisation and development of agricultural co operation in Scotland.

It was decided that the Society be represented at the Conference by the following: Mr James R. Lumsden (Chairman), Major R. F. Brebner, C.B.F., and Sir Joshua Ross Taylor.

Scottish Red Cross Agriculture Fund

The Secretary submitted a Report on the progress of the Fund during the period from 16th April 1944, the close of the fourth year's activities up to that date.

The Report stated that between 17th April and that date a sum of £44,252 had been received. This represented a considerable increase compared with the total for the corresponding period last year. The increase was largely accounted for by the receipt of a magnificent donation of £20,224 from the Stewartry Committee as a result of their Free Gift Sale at Castle Douglas. Other splendid contributions had been received, and these were referred to in detail.

The Chairman, Mr Lumsden, expressed the congratulations of the Board to the Stewartry Committee on the record result of their effort on behalf of the Fund. The agricultural community all over the country had made a most wonderful response to the appeal of the Red Cross.

The Earl of Home, K.T., as Chairman of the Fund, expressed thanks to all those who had contributed to the Fund in such a generous manner. He feared that there might be a slackening off of the efforts on behalf of the Fund when the European War ended. There would be work to do for the sick and wounded for a year or two after the war was over, and on that account he hoped that people everywhere would continue their generous support of the Fund for a few more years.

Demonstration and Exhibition of New Implements

Minutes of Meetings of the Special Committee on New Implements, dated 12th July and 3rd August 1944, were submitted and approved.

The first of these Minutes dealt with the arrangements which the Committee had made for a Demonstration and Exhibition of New Implements to be held at Almond Hill, Kirkliston, on Wednesday and Thursday, 6th and 7th September. The second Minute reported the abandonment of the proposed Demonstration and Exhibition. When the Committee met on 3rd August, the day after the entries closed, it was reported that, while various miscellaneous implements had been entered, there was only one combine harvester, and no potato harvester had been entered. It was believed that this lack of entries was in large measure due to the action of the Agricultural Engineers' Association, London, which it was understood, had issued a recommendation to its members not to take part in the Demonstration. The Committee felt that to hold the Demonstration and Exhibition under these circumstances would not serve the purpose for which it was intended, and it was accordingly decided to abandon it.

Sir Joshua Ross Taylor, Convener of the Implements Committee, referring to the cancellation, said he had since heard that the Agricultural Engineers' Association now regretted their action. They were sorry that the recommendation was issued, and that they did not support the Demonstration that was proposed. In view of that fact he refrained from saying exactly what he thought about the Association's action. He would say this, however, that their action was a poor return for the facilities and consideration that they had received from the Highland Society, and also a very poor return to the farmers of Scotland for the very substantial trade that many of these firms had enjoyed in the past. In conclusion, he said he would like to add that, in spite of the

fact that the Demonstration did not come off, the Society's thanks to Mr William Allison were in no way lessened for the public-spirited manner in which he had offered the necessary facilities for the Demonstration at Almond Hill.

Proposed Experimental Station for Agricultural Implements and Machinery.

Sir Joshua Ross-Taylor said that from his experience in connection with the recent Demonstration and Exhibition, he had come to the conclusion that it was unfair to ask any one farmer to give facilities for a Demonstration on a large scale. It practically meant turning over his farm to be tramped by thousands of people, who showed little consideration as to whether they were walking over crops or seeds. The question arose as to how best Scottish farmers might have an opportunity of seeing new implements and machinery in operation.

There was an Institute of Agricultural Engineering at Askham Bryan, York, but he understood the Institute's tenure of its present buildings and land would soon expire and the Institute would probably be moved to the South of England. That meant that few, if any, of the Scottish farmers would be able to get in touch with the Institute. He moved that the Directors approach the Department of Agriculture with a suggestion that steps be taken to institute an Experimental Station for Agricultural Implements and Machinery in Scotland. It was a matter for discussion whether the suggested station should be an independent unit or whether it should be associated with one, or with all three, of the Agricultural Colleges in Scotland.

Such a station would provide facilities for trying out new implements and machines under conditions prevailing in Scotland, thus providing farmers with opportunities for judging the suitability of these implements and machines for use on Scottish farms. Such a station would also provide facilities for training young farm-workers in the use and maintenance of farm tractors and the adjustment and control of the implements to be used with them.

Mr Thomas Hutchison, Aberdeen, in seconding the motion, said that Scotland had been somewhat neglected so far as farm machinery was concerned. Mechanised farming had come to stay and would be further developed. For that reason he would like to see an experimental station set up, not out of the funds of the Society but by a grant from the Department. It need not be on the same ambitious scale as Askham Bryan, but it would be a step in the right direction.

The motion to approach the Department of Agriculture on the subject was unanimously agreed to.

Post-war Wool Marketing.

The Secretary reported the receipt during September of a letter from the Scottish Agricultural Organisation Society, Ltd., inviting the Society to appoint three representatives to a Conference to be held on 12th October 1944 on the subject of Post-war Wool Marketing.

After consultation with the Chairman of the Board, the following had been requested to represent the Society at the Conference: Major R. F. Brebner, C.B.E.; Mr J. W. Alexander, M.V.O., of Newton, Golfhill, Moffat; Captain James Craig, Innergeldie, Comrie.

Major Brebner gave a brief report on the proceedings, indicating that after a long discussion the Meeting finally decided, in principle, to have a Wool Marketing Board for Scotland, and it was remitted to a small Committee to go into the matter and prepare a report for a further Meeting.

Seed Potato Trade.

The Secretary reported that a letter had been received from the Department of Agriculture on 22nd July enclosing copy of a Memorandum on the Post-war Reconstruction of the Seed Potato Trade, prepared by the National Association of Seed Potato Merchants. The letter stated that the Department would be glad to have the observations of the Society thereon.

The Memorandum had been submitted to Mr James Paton, Kirkness, Glencraig, and Mr W. D. Simpson, Highfield, North Berwick, who had prepared Comments thereon, and these were submitted to the Meeting.

After a statement by Mr Simpson with respect to the Memorandum and the Comments, it was agreed that the latter be forwarded to the Department of Agriculture for Scotland.

First Post-war Show at Inverness.

Major R. F. Brebner reported on inquiries which had been made as to the possibility of getting timber and transport for a Show at Inverness in 1946. He reminded the Board that they had decided that the first post-war Show should take place at that centre. With Sir Joshua Ross-Taylor and the Secretary he had interviewed officials of the Timber

Control Department of the Ministry of Supply and officials of the Ministry of War Transport. The Timber Control officials, while they could give no guarantee, agreed that there should be no difficulty in obtaining the necessary timber in 1946. The Transport officials did not foresee any undue difficulties with respect to transport.

With regard to the showground at The Bughts, Inverness, Mr Walker of Leys had reported that a good deal of it had been ploughed up. Of the 49 acres of the showyard, 28 acres were under cultivation, while 8 of the 18 acres of the car park were also under cultivation. Mr Walker informed them that the Provost and Councillors of Inverness were alive to the situation, and were going to get the land put back into grass at the earliest possible moment so as to be fit for the Show in 1946.

The Chairman said they all hoped it would be possible to have the Show in 1946. Meantime they would continue their inquiries and keep in touch with the Ministry officials.

Finance.

A Minute of Meeting of Committee, dated 1st November, was submitted and approved.

The Minute dealt with the following matters:—

Members' Subscriptions.—The Secretary reported that at that date the amount received from members in Life subscriptions was about £20 in excess of the total received for the preceding year. There was a falling off in annual subscriptions of almost £200. Ninety-two members were on service with His Majesty's Forces, and, in accordance with the decision of the Directors, were retained on the Roll of Members without payment of subscriptions.

Scottish Agricultural Organisation Society, Ltd.—It was recommended that the grant of £100 to the Scottish Agricultural Organisation Society, Ltd., be again renewed for the year 1945.

Royal Scottish Agricultural Benevolent Institution.—It was recommended that the grant of £100 to the Royal Scottish Agricultural Benevolent Institution be renewed for the year 1945.

"Duthie" Prize Fund.—The Secretary reported the receipt of £900 from the executors of the late Mr Duthie Webster, being the amount bequeathed by Mr Duthie Webster to found a "Duthie" Prize for Shorthorn Cattle at the Society's Annual Show—£1000 less estate duty £100.

MEETING OF DIRECTORS, 10TH JANUARY 1945.

Mr JAMES R. LUMSDEN of Arden, Dumbartonshire, in the Chair.

Present.—*President*—Sir Donald W. Cameron of Lochiel, K.T. *Ordinary Directors*—Mr R. Scott Aiton; Mr William Allison; Mr William Brown; Mr Ian M. Campbell; Mr W. J. Campbell; Mr James Clark; Captain James Craig; Mr James Durno; Mr Alexander Forbes; Mr James Johnston; Mr J. E. Kerr; Mr John Kerr; Mr William H. Lawson; Mr Robert W. Meikle; Mr A. W. Montgomerie, O.B.E.; Mr William Montgomery; Mr John Niven; Sir Joshua Ross-Taylor; Mr W. D. Simpson; Captain R. J. Thomson; Mr James Withier; Mr James Wyllie. *Extraordinary Directors*—Mr Peter Gordon; Mr George Grant; Mr Thomas Hutchison; Mr James Kilpatrick; Mr James R. Lumsden; Mr Finlay MacGillivray; Mr James Paton. *Treasurer*—The Earl of Home, K.T. *Auditor*—Mr Geo. James Gregor, C.A.

The late Earl of Strathmore, K.G., K.T.

Before proceeding with the business of the Meeting, the Chairman said it was with deep regret that he had to refer to the death, since their last Meeting, of the Earl of Strathmore, K.G., K.T., G.C.V.O., a member and former Vice-President of the Society. The late Earl, he said, was a member of the Society for thirty-six years, and on three occasions occupied the office of Vice-President—in 1912, 1934, and 1933.

A representative of one of the oldest noble families in Scotland, the Earl of Strathmore took a keen interest in agriculture and in the administration of his extensive estates. He was a popular landlord and took a warm personal interest in the welfare of his tenants, by whom he was held in high esteem. Besides his interest in agriculture, he devoted much of his time and attention to forestry, regarding which he possessed practical knowledge and special skill.

As Lord-Lieutenant of Angus for thirty-two years he rendered valuable public service to the county. He filled many other high offices, and his sympathetic interest and support were ever available on behalf of any cause calculated to further the happiness and pros-

perity of the rural community. His death was a loss to the Society and to the country which they deeply deplored.

A Minute of regret and sympathy was submitted and adopted, the members present upstanding, and the Secretary was instructed to forward a copy to the family of the deceased.

The late Mr David M'Kail.

The Chairman also referred to the death of Mr David M'Kail, who was well known to most of them as Agricultural Correspondent of 'The Scotsman.' In that capacity Mr M'Kail was for many years regularly in attendance at the Society's Annual Shows and also at the meetings of the Board of Directors. In his able and comprehensive reports on the Shows he rendered a valuable service to the Society and to the agricultural community. His reports on their meetings were characterised by clearness and understanding.

As a man Mr M'Kail was universally popular. His genial personality and modest and unassuming manner made him respected and esteemed by all with whom he was associated. His death was a loss to agriculture and to the Society, which they deeply regretted.

Honorary Secretary.

A Minute of Meeting of Office-bearers' Committee, dated 10th January 1945, was submitted.

The Minute stated that the Committee had unanimously decided to recommend that Mr Alexander Murdoch, East Hallside, Cambuslang, be nominated for election as Honorary Secretary of the Society to fill the vacancy caused by the resignation of Colonel F. J. Carruthers, C.B., of Dormont.

The Chairman, in moving the adoption of the recommendation, said he was quite sure Mr Murdoch would adequately fill the post of Honorary Secretary. He had been Chairman of Directors for a period of three years, and, during that time and during the whole of his tenure of office as a Director, he had rendered excellent service to the Society.

The Minute was approved, and it was unanimously decided to nominate Mr Murdoch for election as Honorary Secretary of the Society at the General Meeting to be held that afternoon.

Scottish Agricultural Organisation Society.

On the motion of the Earl of Home, K.T., Treasurer, it was unanimously agreed to confirm the proposed grant of £100 to the Scottish Agricultural Organisation Society for the year 1945.

Royal Scottish Agricultural Benevolent Institution.

On the motion of the Earl of Home, K.T., it was also agreed to confirm the proposed grant of £100 to the Royal Scottish Agricultural Benevolent Institution for the year 1945.

Proposed Experimental Station for Agricultural Implements and Machinery.

The Secretary reported that he had received a reply from the Department of Agriculture for Scotland with respect to the suggestion by the Board of Directors that steps should be taken to establish an Agricultural Machinery Experimental Station in Scotland. The Department expressed their willingness to discuss the matter with representatives of the Society, and suggested Wednesday, 17th January, as a date for the Meeting.

It was agreed that the Society be represented at the Meeting by Mr James R. Lumsden, Chairman, Sir Joshua Ross-Taylor, Major R. F. Brebner, C.B.E., Mr James Paton, and Mr Thomas Hutchison.

Sir Joshua Ross-Taylor said that when he made the suggestion at last Meeting he spoke of a sub-station, but the Directors indicated that they would rather have an independent station in Scotland. That did not seem feasible, as it would mean the duplication of technical staffs in England and Scotland. The intention was to have a main station in England, with a number of subsidiary stations. Scotland, it was proposed, should have a large subsidiary station. He thought the Directors should agree to that suggestion.

Inspection of Consignments of Seed Potatoes.

The Secretary reported that a letter had been received from the Department of Agriculture, dated 14th December, with reference to the inspection of consignments of seed potatoes. In view of complaints made about unsatisfactory dressing and quality of some of the consignments of Scottish seed potatoes sent to England last season, the Ministry of Food and the Department, acting in conjunction, were making arrangements to undertake "check" inspections of this season's consignments. These inspections would be

made at the ports of consignments arriving for shipment and at loading stations. The object of the inspections would be to see that the consignment complied with the requirements in respect of size and dressing of the potatoes and as regards freedom from disease. A Meeting to discuss the arrangements was to be held on Friday, 22nd December, and two representatives of the Society were invited to attend the Meeting.

The Society was represented at the Meeting by Mr James Paton and Mr W. D. Simpson, who submitted a report on the proceedings. In concluding their report the Society's representatives stated that they believed the Conference had served a very useful purpose, and that merchants and farmers alike would do their utmost to deliver seed potatoes of the highest possible standard.

The Chairman said they were indebted to Mr Paton and Mr Simpson for having attended the Conference and for giving them such a satisfactory report.

Hill Sheep Subsidy.

The Chairman reported that, with Major Brebner, he had attended a Meeting on 21st November, called by the Scottish National Farmers' Union and Chamber of Agriculture, with regard to the hill sheep subsidy. They afterwards met the Department of Agriculture. What took place at that Meeting was confidential. Nothing, so far as he knew, had yet been decided as to what subsidy was to be paid for that season. They had done their best to put forward the views of the hill sheep farmers.

Proposed Importation of Cattle from Canada and America.

Letters were submitted from the Ministry of Agriculture and Fisheries with respect to a proposed importation of pedigree Canadian Holstein cattle from Canada and Poll Hereford cattle from America. The importation of the cattle from Canada would be under the terms of the Ottawa Agreement, Act, 1932, and not under those of the Importation of Pedigree Animals Act, 1925. The views of the Society were invited with regard to these proposed importations.

The Secretary stated he had been in communication with the British Friesian Cattle Society and the Hereford Herd-Book Society, who informed him that the animals would not be eligible for registration in the herd-books of these breeds.

After discussion, the Secretary was instructed to inform the Ministry of Agriculture and Fisheries that this Society saw no objection to the proposed importations.

Conference on Co-operative Marketing.

The Chairman reported that he had represented the Society at a Conference of Affiliated Societies, held under the auspices of the Scottish Agricultural Organisation Society, on 23rd November. At the Conference there was a full discussion with regard to co-operative marketing, but no definite finding was come to.

The Society had been invited by the Scottish Agricultural Organisation Society to nominate two representatives on the Consultative Council of that Society. He suggested the names of Mr W. D. Simpson, Highfield, North Berwick, and Mr William Allison, Almond Hill, Kirkcaldy, and this was agreed to.

Artificial Insemination.

A pamphlet by Mr Allan Barns Graham of Lymekilns, with regard to the proposed Artificial Insemination Centre in Scotland, was submitted, copies having been circulated to members before the Meeting. In forwarding copies of the pamphlet, Mr Barns Graham said, "I hope your Directors will approve of my leaflet . . . and decide against associating with even the supervision of any such dangerous centre in this country."

The Chairman referred to the previous findings of the Board of Directors with regard to artificial insemination, and it was agreed that the Society confirm its previous findings, and agree to keep its representatives on the Supervisory Committee.

Sir Joshua Ross-Taylor said he thought Mr Barns Graham should be congratulated on the stand he had taken in refusing to give a site on his property for an Artificial Insemination Centre. He had the whole-hearted support of the majority of the Directors in his action. The Directors decided against the proposal from the beginning, but they thought it wise to send two members to act as "watch-dogs" on the Committee which the Department of Agriculture had set up.

Scottish Housing Advisory Committee.

A letter was submitted from the Secretary of the Scottish Housing Advisory Committee, inviting the Society to submit evidence on the subject of Modernisation of Existing Dwelling-houses.

On the motion of the Chairman, it was decided that the following be appointed a Special Committee, with powers to prepare a statement of the Society's views and submit evidence—Major R. F. Brebner, C.B.E. (Convener), Mr James Durrio, Mr William Montgomery, Mr James Paton, Sir Joshua Ross-Taylor, Mr W. D. Simpson, Captain R. J. Thomson, with the Chairman, *ex officio*.

Wool Marketing.

A letter was submitted from the Secretary of the Wool Marketing Committee, recently appointed by the Minister of Agriculture and the Secretary of State for Scotland. The letter invited the Society to forward any representations it might wish to make on the subject.

Captain James Craig explained that, at a recent Conference on Post-war Wool Marketing, the setting up of a Wool Marketing Board for Scotland was considered, and a Joint Committee, on which the Society was represented, was appointed to go into the whole matter. It occurred to him that that might be a suitable body to prepare and present evidence. It would be greatly to the advantage of Scotland if they could speak on this subject with a single voice.

After some discussion, it was agreed, on the suggestion of the Chairman, that it be remitted to the Society's representatives on the Joint Committee—Major R. F. Brebner, C.B.E., Mr J. W. Alexander, M.V.O., and Captain James Craig—either to prepare evidence on behalf of the Society or to co-operate with the Joint Committee, whichever they thought best.

Protest against Summer Time.

Mr James Paton, Kirkness, Glencraig, moved that the Society protest against the continuance of Double Summer Time in summer and of Single Summer Time in winter. He said this was a matter which concerned not only the Directors but every member of the Society. He thought there was nothing more detrimental to food production, and especially to the ingathering of crops, than the hour of Summer Time during winter. A well-known Perthshire farmer had estimated that, on account of the operation of Summer Time, he was losing five hours per week for every man on his farm, and he put the men employed on arable land at 2½ men per 100 acres.

Continuing, Mr Paton said he had taken the trouble to go into the figures in his own Executive Committee area, where they had 57,000 acres under the plough. If the above figures were applied, they were losing in that area alone 7125 man-hours per week. If this were multiplied throughout Scotland, it indicated an enormous loss to the agricultural industry all because of Summer Time.

Mr A. W. Montgomerie, Westburn, seconded the motion, and said that the effects of Summer Time were even worse in connection with dairying.

It was remitted to Sir Joshua Ross-Taylor, Mr James Paton, and the Chairman to draw up a strong protest to be sent to the Authorities, demanding the discontinuance of Summer Time this year.

MEETING OF DIRECTORS, 4TH APRIL 1945.

Mr JAMES R. LUMSDEN of Arden, Dumbartonshire, in the Chair.

Present.—Ordinary Directors—Mr R. Scott Aiton; Mr J. W. Alexander, M.V.O.; Mr William Allison; Mr W. J. Campbell; Captain James Craig; The Earl of Elgin and Kincardine, K.T., C.M.G.; Mr Alexander Forbes; Mr J. E. Kerr; Mr William H. Lawson; Mr Robert W. Meikle; Mr A. W. Montgomerie, O.B.E.; Mr William Montgomery; Sir Joshua Ross-Taylor; Mr W. D. Simpson; Mr Matthew Templeton; Captain R. J. Thomson; Mr James Wither. *Extraordinary Directors*—Major R. F. Brebner, C.B.E.; Mr Peter Gordon; Mr George Grant; Mr Thomas Hutchison; Mr James Kilpatrick; Mr James R. Lumsden; Mr Finlay MacGillivray; Mr James Paton. *Hon. Secretary*—Mr Alexander Murdoch, East Hallside, Cambuslang.

Honorary Secretary.

Mr Alexander Murdoch, East Hallside, Cambuslang, expressed his appreciation of the honour which the Directors had conferred upon him in appointing him Honorary Secretary of the Society.

Colouring Matter in Sheep Dips.

A letter, dated 29th March, from the National Farmers' Union and Chamber of Agriculture of Scotland, was submitted with reference to the question of legislation to control the manufacture and use of sheep dips containing colouring matter which had a detrimental effect on wool. The War Committee of the Union had decided to invite representatives of the Sheep Breed Societies and the Northern Pastoral Club to discuss the position with them at a Meeting to be held on 11th April. Representatives of Scottish Dip Manufacturers would attend during the afternoon of the Meeting, when those attending the morning Meeting would have an opportunity of discussing the matter with them. The Society was invited to nominate a representative to attend the Meeting.

The Chairman moved that the Directors appoint Mr J. W. Alexander, M.V.O., Convener of the Science Committee, to represent the Society at the Meeting, and this was agreed to.

Mr Alexander said he would like some indication of the Directors' views on the matter.

The Chairman said that the National Association of Scottish Woollen Manufacturers had written to the Society on the subject, and he quoted from the Secretary's reply to their letter. In this it was pointed out that the Society had devoted much time and consideration to the subject of Discolouration of Wool during the past twenty years. Reports of these proceedings appeared in the Society's 'Transactions,' beginning with the year 1926 and carrying on to the year 1937. Conferences were held with representatives of the Skinners' Association, the Scottish Wool Association, and the various Sheep Breed Societies. Investigations into the character of bloom dips were carried out by the Society's Consulting Chemist, Dr J. F. Tocher, and eventually the Society adopted a rule that sheep artificially coloured should be disqualified from competing at the Society's Annual Shows. A great deal of publicity had been given to the matter through the Society's action.

In the course of a discussion which followed, Sir Joshua Ross-Taylor stated that since he became a member of the Advisory Committee on Wool, he had seen the great amount of damage done to wool of Cross Lambs and other lambs sold at the Autumn Sales as a result of the use of dips containing colouring matter. He thought it was now time that some regulation was passed prohibiting its use.

The Chairman said he thought they were all agreed that some regulation was desirable.

Committee on Agricultural Education in Scotland.

A Minute of Meeting of Education Committee, dated 4th April, was read and approved.

The Minute stated that the Committee had considered a request from the Agricultural Education (Scotland) Committee to nominate one or two representatives to meet the Committee for the purpose of stating the views of the Society on new proposals submitted by two members of the Committee. It was recommended that Sir Joshua Ross-Taylor, Mr James R. Lumsden, and the Secretary be nominated as the Society's representatives to appear before the Agricultural Education (Scotland) Committee on Thursday, 12th April.

Modernisation of Existing Houses.

The Chairman reported that the Special Committee appointed at last Meeting on 10th January had prepared a Memorandum of Evidence on the Modernisation of Existing Houses in Rural Areas, and that this Memorandum had been forwarded to the Secretary of the Scottish Housing Advisory Committee. The Society's representatives had, so far, not been asked to give oral evidence, but they might still be asked to do so. Copies of the Memorandum had been sent to all members of the Board, and he asked whether any Director wished to make any comment thereon.

Mr Peter Gordon, Balcarraig Moor, Port William, referred to the difficulty in the South of Scotland of getting shepherds to live on outlying hill farms. He said that if Scotland were to produce from the hills what the Government and Nation needed at the present time, there must be houses for the people to live in.

In the course of discussion which followed, Sir Joshua Ross-Taylor expressed the view that they would not get a married man with a wife and family to live up in the hills. The time for that had passed. It was for the employer to provide a house in a more accessible position.

The Chairman said that if the Society's representatives got an opportunity of appearing before the Housing Advisory Committee, they would bring up the point referred to.

Protest against "Summer Time."

The Secretary reported that, in accordance with the decision at last Meeting of the Board, the Special Committee appointed had prepared a Memorandum setting forth the views of the Society regarding "Summer Time." Copies of the Memorandum had been

sent to all Scottish Members of Parliament, to the Scottish Representative Peers, and to Government Departments.

He had received an official reply from the Home Secretary's Office, enclosing a copy of the statement made to the House of Commons by Mr Herbert Morrison on 1st March. This stated that Double Summer Time would start on 2nd April and last until 15th July, and that it might be possible, in accordance with pro-war practice, to revert to Greenwich Mean Time on 7th October.

The Chairman remarked that they were thankful for even this small concession. They hoped the war position by 15th July would be such that Double Summer Time would cease at that date.

Proposed Agricultural Machinery Experimental Station.

Sir Joshua Ross-Taylor, Convener of the Implements and Machinery Committee, reported on a meeting which representatives of the Committee had had with officials of the Department of Agriculture on 17th January, at which the question of setting up an Agricultural Machinery Experimental Station in Scotland was discussed. The Department, he said, was anxious to see a Station set up in Scotland, but they were told it must be a Sub-Station to the main Station in England. To have a Station for Scotland alone would mean a duplication of staff, which seemed unnecessary. A Committee had been appointed, and was to meet on 19th April.

The Chairman said that, as the Board was represented on the Committee by Sir Joshua Ross-Taylor and other members, they would be kept in touch with every development of the project.

Inspection of Growing Crops of Potatoes.

Mr W. D. Simpson, Highfield, North Berwick, submitted a report on the proceedings at a Conference in connection with the Scheme for the Inspection of Growing Crops of Potatoes held at St Andrew's House on 25th January.

In speaking to the report, Mr Simpson said many growers had been disappointed with results from the planting of stock seed potatoes. In the regulations there was a rule that Inspectors, in visiting lots entered as stock seed, should take note if there had been an excessive amount of "roguing," and, if so, should reject them. In future, that rule would be more strictly enforced.

The Chairman thanked Mr Simpson for attending the Meeting as the Society's representative, and for his excellent report.

Artificial Insemination.

A letter from Mr W. McNair Snadden, M.P., was submitted, forwarding copy of the Agriculture (Artificial Insemination) Bill which was expected to come up for second reading at an early date. He said that up to the present he had adopted an attitude of critical examination of any measures in connection with the practice and control of artificial insemination, and would be grateful if he could have the considered views of the Directors on this latest piece of legislation.

The Secretary stated that he had informed Mr Snadden of what the Directors had decided in the past regarding artificial insemination, and of the appointment of two representatives of the Society on the Supervisory Committee.

In a further letter Mr Snadden stated that he appreciated the Directors' views on the general question of opposition to the introduction of the practice. His own attitude was very much the same as that expressed by the Directors at past Meetings, but he had come to the conclusion that whether we liked it or not, it would be a mistake to take too narrow a view of the whole question. We must work for the closest possible supervision of artificial insemination in this country.

The Chairman said the present Bill was only concerned with the making of financial provisions for experimental research. If the Directors decided not to take any exception to the provisions of the Bill, he thought it would not be inconsistent with their previous decision against the introduction of artificial insemination.

It was agreed that the Secretary should reply to Mr Snadden to the effect that the Directors did not wish to oppose the Bill, but that they still desired to see the greatest amount of supervision exercised over the practice.

Proposed Importation of Holstein Friesian Bull from Canada.

A letter was submitted from the Ministry of Agriculture and Fisheries with respect to a proposed importation of a pedigree Holstein Friesian Bull from Canada. The importation of this bull would be under the terms of the Ottawa Agreements Act, 1932, and not under the Importation of Pedigree Animals Act, 1925.

The Secretary stated that he had replied to the Ministry's letter to the effect that this Society had no objection to the proposed importation, and this action was approved.

Animal Diseases Research Association.

An application was submitted from the Animal Diseases Research Association for renewal of the grant of £200 for the current year.

On the recommendation of the Finance Committee, it was agreed that the grant be renewed.

Glasgow Veterinary College.

An application from the Glasgow Veterinary College was submitted asking for a renewal of the grant of £150 for the current year.

On the recommendation of the Finance Committee, it was agreed that the grant be renewed.

Finance.

A Minute of Meeting of Finance Committee, dated 4th April, was submitted and approved.

The Minute dealt with the following additional matters :—

Scottish Red Cross Agriculture Fund.—The Committee recommended that the expenses incurred in connection with the activities of the Scottish Red Cross Agriculture Fund Committee, during its fifth year, amounting to a sum of £184, 19s. 2d., be defrayed by the Society.

Glasgow and West of Scotland S.P.C.A.—It was recommended that a grant of £10 be again given to the Glasgow and West of Scotland Society for the Prevention of Cruelty to Animals for the current year.

PROCEEDINGS AT GENERAL MEETINGS.

GENERAL MEETING, 7TH JUNE 1944.

The EARL OF HOME, K.T., Treasurer of the Society, in the Chair.

New Members.

The Secretary submitted a list of 108 candidates for election to membership. He said that was a considerably larger number than any submitted to a General Meeting during the war. They were largely indebted to a Director, Captain Ian S. Robertson, Linkwood, Elgin, for sending in 86 names from Morayshire and district. These were balloted for and duly elected.

Major R. F. Brebner, C.B.E., Chairman of the Board of Directors, called attention to the presence of Mr J. Milne Henderson, C.A., Edinburgh, who, he said, was elected a member of the Society in 1876. He was sure they would desire to congratulate him on his long connection with the Society and to wish him the best of health.

Mr Milne Henderson said it was a great pleasure to be associated with such a magnificent Society as the Highland and Agricultural Society. He said that it was seldom that he had missed attending the Annual Show.

Election of Office-bearers.

Major R. F. Brebner, C.B.E., Chairman of the Board of Directors, moved that the following be elected Office-bearers of the Society for the year 1944-45:—

President.—Sir Donald W. Cameron of Lochiel, K.T., Achnacarry, Spean Bridge, Inverness-shire.

Vice-Presidents.—The Duke of Sutherland, K.T., P.C., Dunrobin Castle, Golspie; The Earl of Leven and Melville, K.T., Glenferness House, Nairn.

Ordinary Directors. 1941.—Mr Robert W. Meikle, Bearcrofts, Grangemouth; Mr James Wyllie, Beaumont, Victoria Road, Dumfries; Mr John Korr, Yorkston, Gorebridge, Midlothian; Mr Ralph S. MacWilliam, Garguston, Muir of Ord, Ross-shire; Mr A. W. Howison, Rannagulzion, Blairgowrie; Mr A. A. Hagart Speirs of Elderslie, Houston House, Renfrewshire; Mr John P. Sleight of St John's Wells, Fyvie; Captain R. J. Thomson, Kaimes, West Linton.

1942.—Mr J. W. Alexander, M.V.O., of Newton, Golfhill, Moffat; Mr W. J. Campbell, 61 Fountainhall Road, Edinburgh; Mr Francis W. Walker of Leys, Leys Castle, Inverness; Mr William H. Lawson, Frithfield, Anstruther; Mr William Brown, Craigton, Bishopston, Renfrewshire; Mr John N. Reid, Cromley Bank, Ellon; Sir Joshua Ross-Taylor, Mungoswells, Duns; Mr J. E. Korr of Harviestoun, Dollar.

1943.—Mr William D. Simpson, Highfield, North Berwick; Mr Ian M. Campbell, Bal Blair, Inverchin, Sutherland; The Earl of Elgin and Kincardine, K.T., C.M.G., Broomhall, Dunfermline; Mr A. W. Montgomerie, Westburn Farm, Cambuslang, Lanarkshire; Mr Alexander Forbes, Rettis, Banff; Mr R. Scott Aiton, M.C., Legerwood, Earliston; Captain James Craig, Innergeldie, Comrie; Mr James Withier, Awhirk, Stranraer.

1944.—Captain Ian S. Robertson, Linkwood, Elgin; Mr John Niven, Glogaburn, Tibbermore; Mr James Clark, Windlaw Farm, Carmunnock; Mr James Durno, Crichtie, Inverurie; Mr Matthew Templeton, Goshen Bank, Kelso; Mr James Johnston, Duncroft Home Farm, Falkirk; Mr William Montgomery, North Milton, Kirkeudbright; Mr William Allison, Almond Hill, Kirkcubbin.

Extraordinary Directors.—Major R. F. Brebner, C.B.E., The Leuchold, Dalmeny House, Edinburgh; Mr Alexander Clark, Strathore House, Thornton, Fife; Mr Peter Gordon, Balcarraig Moor, Port William; Mr George Grant of Glenfarclas, Blackboat; Mr Thomas Hutchison (Barclay, Ross & Hutchison), 67-71 The Green, Aberdeen; Mr James Kilpatrick, Craigie Mains, Kilmarnock; Mr James R. Lumsden of Arden, Dum-

bartonshire; Mr Finlay MacGillivray, Greenhead, Pencoiltland, East Lothian; Mr Alexander Murdoch, East Hallside, Cambuslang, Lanarkshire; Mr James Paton, Kirkness, Glencairg.

Treasurer.—The Earl of Home, K.T., The Hirsell, Coldstream.

Honorary Secretary.—Colonel F. J. Carruthers, C.B., of Dormont, Lockerbie.

Major Brebner added that, at a Meeting of the Board of Directors held earlier that day, Captain R. J. Thomson of Kaimes, West Linton, was elected a Director in place of the late Major R. W. Sharpe of The Park, Earliston.

Mr R. Scott Aiton, M.C., Legerwood, Earliston, seconded the motion, and the Office-bearers were duly elected.

Special Grants.

The Earl of Home, K.T., Treasurer of the Society, moved approval of the following Special Grants, which were recommended by the Board of Directors:—

- (1) £200 for the current year, to the Animal Diseases Research Association.
- (2) £150 for the current year, to the Glasgow Veterinary College.
- (3) £50 for the current year, to the Edinburgh Highland Reel and Strathspey Society, plus £25 extra war contribution.
- (4) £10 to the Glasgow and West of Scotland Society for the Prevention of Cruelty to Animals.

Mr George Grant, Glenfarolas, Blacksboat, seconded, and the Special Grants were duly approved.

Argyll Naval Fund.

Mr James R. Lumsden of Arden, Convener of the Special Committee, in referring to a Minute of the Committee approved by the Directors earlier that day, said that a few more appointments to the list of beneficiaries could be made if suitable applicants came forward. Particulars of the Fund could be obtained from the Secretary. The Fund was for the sons of parents of Highland ancestry entering the Royal Navy.

Scottish Red Cross Agriculture Fund.

Mr James Paton, Kirkness, Glencairg, submitted the following report on the activities of the Committee during its fourth year of operations from 17th April 1943 to 16th April 1944. He said that the Fourth Annual Report had now been published, and would appear in the forthcoming volume of the Society's 'Transactions.'

The total amount of contributions received was £171,348, 10s. 4d. To this was added a sum of £90, 6s., being interest accruing on sums placed on Deposit Receipt for short periods. That gave a total for the year of £171,438, 16s. 4d.

Adding the amount raised in the fourth financial year to the sums raised in the first, second, and third years—£115,876, 14s. 2d. in 1940-41, £109,839, 6s. 10d. in 1941-42, and £151,949, 3s. 7d. in 1942-43—gave a grand total of £549,104, 0s. 11s. raised by the Committee during its four years of activity.

As in the preceding years, the money raised during the fourth year had been handed over to the Scottish Branch, British Red Cross Society, and the St Andrew's Ambulance Association. The total allocation to the former body during the four years was £498,404, 19s. 1d., and to the latter £50,699, 1s. 10d.

The expenses incurred during the fourth year, which amounted to a sum of £232, 6s. 5d., had again been defrayed by the Highland and Agricultural Society, which had also provided the staff, office accommodation, telephone service, &c., free of charge.

At a Meeting of the General Committee of the Fund, held on 31st May, cordial resolutions of thanks were passed to all those bodies and individuals who had contributed so generously to the remarkable success of the Fund. Grateful acknowledgment was made of the valuable help and co-operation extended to the Committee by the Directors and Members of the Highland and Agricultural Society, and the Society's Secretary and staff were accorded a warm vote of thanks for the work they had performed in furtherance of the movement.

Mr Paton went on to say that Lord Kinnaird, Chairman of Council of the Scottish Branch, British Red Cross Society, in seconding the adoption of the Report at that Meeting, had expressed the gratitude of his Society to the Agricultural community for their great generosity, and to the Committee and the Secretary and his staff for the wonderful spirit of enthusiasm they had aroused throughout the country on behalf of the Red Cross. Vast numbers of parcels were still being sent out to prisoners of war, and the messages from returned prisoners showed how much they had been appreciated. But for these parcels they would have suffered grievously. The thanks of these prisoners were a fine and adequate reward.

Mr Paton concluded by saying that the prospects for the fifth year were encouraging.

Already contributions had come to hand amounting to a total of £3630, including a handsome one of £2711 from the Maud Area Committee, Aberdeenshire. Several centres which had raised large sums in the past, but whose efforts are biennial, were actively engaged in organising great efforts this year, and had placed their target figures at a remarkably high level. The Committee felt confident that the Agricultural community would continue to play its part in meeting the ever-increasing demands for succour to our sick and wounded in the Forces and help and sustenance to our men in enemy hands.

Lord Home said it was a most satisfactory report. As Chairman of the Committee of the Fund he would like to express, on behalf of his Committee, their indebtedness to all for the help received during the last four years. It had been a wonderful result, and they looked forward for still greater efforts in the current year.

Lord Elgin said he thought a special word of thanks might be given to the Live Stock Auctioneers. Lord Home said he had mentioned the services of the Live Stock Auctioneers at the Annual Meeting of the Committee, and had pointed out that if it had not been for their kindness the Free Gift Sales could not have taken place.

New Implements.

Sir Joshua Ross-Taylor, Convener of the Implements Committee, submitted the following report:—

In November 1943 the Directors had before them a proposal that the Society hold two Demonstrations of the latest implements in 1944—one in the early summer and the other in the autumn. The proposal was remitted to the Implements Committee for consideration, and, if so decided, to make the necessary arrangements.

The Implements Committee, after due consideration, had made the following recommendations: (1) that there be a Demonstration in April which would include Potato Planters, Potato Coverers, Row-Crop Implements, and Robot Transplanters; (2) a Demonstration in the late summer or early autumn, which would include Combine Harvesters, anything new in Binders, Beet-harvesters, and Potato Lifting Machines. It was suggested that the Spring Demonstration be held in the County of Perth or the County of Angus, and the Autumn Demonstration in the Lothians. Each demonstration would last for two days, and at the same time there would be on exhibition other new and improved implements which it might not be possible to show in actual operation.

These proposals were approved by the Directors on 5th January 1944, and, on the recommendation of the Implements Committee, it was remitted to the following Sub-Committee to carry out the arrangements: Sir Joshua Ross-Taylor (*Convener*), Major R. F. Brehner, C.B.E., Mr James Paton, Mr Thomas Hutchison, Mr W. D. Simpson and Mr Finlay MacGillivray. Mr T. A. Wedderspoon, Castleton, Eassie, Angus, was later co-opted as a member of the Committee.

An excellent site for the Demonstration of Implements adapted for spring work was placed at the disposal of the Society, through the courtesy of Mr Wedderspoon, at Castleton, Eassie. Mr Wedderspoon had very kindly placed at the disposal of the Society fifty acres of plough-land for demonstration purposes, and a large grass field for exhibition purposes and for use as a car park. Rules and Regulations were drawn up and entries invited by advertisement in the Press. A large and representative entry was received. The date of the Demonstration was fixed for 19th and 20th April.

Mr C. Davies of the Machinery Division of the Ministry of Agriculture was, on the invitation of the Committee, released by the Ministry in order that he might undertake the technical supervision of the Demonstration and furnish a report thereon. The Department of Agriculture and the three Agricultural Colleges in Scotland had kindly agreed to the services of their machinery instructors being made available to assist Mr Davies in the work of supervision.

Through the courtesy of the Lord Provost and Council of Dundee arrangements were made with British Restaurants, Dundee, to provide snack luncheons and teas on the ground. These facilities were highly appreciated by the large number of visitors who had been present at the Demonstration.

Lady Cayzer, Deputy President of the Angus Branch of the British Red Cross Society, had kindly undertaken to arrange for a collection to be taken by V.A.D.s in aid of the Scottish Red Cross Agriculture Fund, and a sum of £221, 0s. 3d. was raised.

The weather on the first day of the Demonstration was unfortunately wet, and only a few of the machines could be seen in operation. On the second day, however, the weather improved and practically all the machines were seen at work. The Society desires to express its appreciation of the public-spirited manner in which manufacturers responded to the invitation to enter implements. The attendance of the public was estimated at 5000 on each day, or 10,000 in all.

Mr Wedderspoon not only placed his fields at the disposal of the Society but also the use of his farm buildings and implements and the services of his staff. The details of the local arrangements were almost entirely in his hands, and he was indefatigable in his efforts to promote the success of the Demonstration. The cordial thanks of the Society were due to Mr Wedderspoon for his most-valuable services.

Mr C. Davies carried out his duties as Technical Supervisor of the Demonstration with tact and efficiency, and the thanks of the Society were due to him, not only for the

manner in which he discharged these duties, but also for his interesting report on the Demonstration. The report will be published in full in the 'Transactions.'

Sir Joshua Ross-Taylor added that reference had been made in the foregoing report to the great assistance that Mr Wedderspoon had rendered to the Committee. If it had not been for Mr Wedderspoon's work the Demonstration could not have been anything like the success it was. He should also like to mention the great help accorded by Mr Thomas Hutchison in the matter. He would at the same time like to record their appreciation of the way the Press received the suggestion of the Demonstration and the publicity they had given to the Demonstration.

He had to report that they had arranged an Autumn Demonstration on Mr William Allison's farm of Almond Hill, Kirkliston, about eight miles from Edinburgh. Some half a dozen fields would be at their disposal; and if they required more ground it would be available at Almond Hill or other farms. He was certain that the Demonstration would be a success.

Major Brebner said they would all agree that the report was a good and satisfactory one.

Farm Buildings.

Major R. F. Brebner, C.B.E., Chairman of the Board of Directors, in a brief report said that the Special Committee appointed in November 1943 had prepared a Memorandum of Evidence to be submitted on behalf of the Society to the Scottish Committee on Farm Buildings appointed by the Secretary of State for Scotland to consider and make recommendations regarding the lay-out, design, and construction of farm buildings after the war. The Memorandum was forwarded to the Secretary of the Committee on 16th February. Representatives of the Society were nominated to appear before the Committee in support of the Evidence, but so far these had not been called upon to appear.

Agricultural Education.

Major Brebner also reported that, on 5th April, the Directors had remitted to the Education Committee to prepare a Statement of Evidence to be submitted to the Committee on Agricultural Education recently appointed by the Secretary of State for Scotland. The terms of reference to that Committee were "To inquire into the organisation, staffing, curricula, and external services of Agricultural Colleges in Scotland and the relationship of the Colleges to the Universities and to the Research Institutes, and to make recommendations."

A Memorandum of Evidence had been prepared by the Education Committee and forwarded, together with the names of representatives to appear before the Committee in support of the Evidence. These representatives had been summoned to appear before the Committee on 8th June.

Major Brebner added that, as the Highland and Agricultural Society were the pioneers of agricultural education in the country, they felt that it was their duty to assist Lord Alness's Committee as much as possible.

Sir Joshua Ross-Taylor, Mungoswells, Duns, Chairman of the National Agricultural Examination Board, submitted the following report on the Forty-sixth Examination for the National Diploma in Agriculture:—

Following representations made, it was decided, in order to assist candidates at the English and Welsh Colleges, to hold two Examinations in 1944—one at Edinburgh during April for Scottish and other students, and the other at Leeds in July for English and Welsh students.

At the Examination at Edinburgh, which was held from 5th to 11th April, 82 candidates presented themselves. The majority of the candidates were from Scottish centres, with the addition of several candidates from Leeds University, the Midland Agricultural College, and other English centres. As a result of the Examination, 23 Diplomas were awarded.

Of the 82 candidates, 2 appeared for all subjects and 1 obtained the Diploma. It was interesting to note that this candidate was a repatriated prisoner of war, who had entered originally for the Examination in a German prison camp. Thirty-seven passed certain subjects previously, and were completing the Examination on that occasion, and of these, 22 were successful in obtaining the Diploma. The names of the successful candidates will appear in the 'Transactions.'

The remaining 43 presented themselves for first groups of three, four, or five subjects, and of these, 28 passed in the subjects for which they appeared, and were entitled to appear for the second group of subjects at a subsequent Examination. Eleven failed in either one or two subjects, for which they will be allowed to reappear in conjunction with the second group of subjects.

At the Examination to be held at Leeds in July, 222 candidates had applied for admission. That number, taken along with the 82 candidates who appeared at Edinburgh, made a total of 304 candidates for the year, which was a record entry for the Examination.

Science.

In the absence through indisposition of Dr J. F. Tocher, Consulting Chemist to the Society, Mr J. W. Alexander, M.V.O., Vice-Convenor of the Science Committee, submitted a report on the work done in the Chemical Department during the first five months of 1944. The substance of the report appears on pp. 96-100 of this volume.

Vote of Thanks.

On the motion of Mr Thomas Hutchison, Aberdeen, a vote of thanks was accorded to the Earl of Home for presiding.

ANNIVERSARY GENERAL MEETING, 10TH JANUARY 1945.

Sir DONALD W. CAMERON OF LOCHIEL, K.T., in the Chair.

In thanking the members for his election as President of the Society, Lochiel said he could assure them that when the Show came to be held in Inverness, as he hoped it would be in 1946, and if war conditions so permitted, the Society would get a very hearty welcome from the people of Inverness and from the Highlands in general.

Election of Members.

The Secretary submitted a list of 50 candidates for election to membership. These were balloted for and duly elected.

Membership.

Mr James R. Lumsden of Arden, Dumbartonshire, Chairman of Directors, reported that the membership of the Society at the beginning of 1944 was 8261. During the year there had been lost, through death, resignations, and other causes, 297 members. New members elected during the year numbered 154 (46 in January and 108 in June), thus making the total membership at that date 8118.

Of that number 5846 were Life Members and 2278 paid subscriptions annually—239 on the higher rate and 2039 on the lower. 93 members of the Society had intimated that they were on service with H.M. Forces, and these, in accordance with a resolution of the Directors, would continue to receive the privileges of membership, without payment of subscriptions, throughout the duration of the war.

Election of Honorary Secretary.

Mr James R. Lumsden moved that, in accordance with the unanimous recommendation of the Board of Directors, Mr Alexander Murdoch, East Hallside, Cambuslang, Lanarkshire, be elected Honorary Secretary of the Society in place of Colonel F. J. Carruthers, C.B., of Dormont, Lockerbie, whose resignation of that office on account of ill-health had been received by the Directors with very deep regret.

Lochiel said they were exceedingly sorry to lose Colonel Carruthers from their deliberations. They hoped he would soon be recovered in health and enjoy some leisure. In nominating Mr Murdoch for the post of Honorary Secretary they felt quite sure that he would very worthily uphold the traditions of that high office of the Society.

The motion was cordially approved.

Finance.

The Earl of Home, K.T., Treasurer of the Society, submitted the Accounts of the Society for the year ending 30th November 1944.

The Society's Capital Funds, he said, had been maintained, and showed a substantial increase over the previous year.

Revenue for the year from all sources amounted to £9136, 17s. 8d., of which £1242, 17s. had been derived from annual subscriptions and £1605, 9s. from life subscriptions.

Expenditure amounted to £8011, 4s. 10d. During the year under review the net expenditure on Educational Work amounted to £147, 3s. 9d.; on Implement Demonstrations, £365, 5s.; on work in the Chemical and Veterinary Departments, £286, 6s. 2d.; on the Society's 'Transactions,' £1081, 1s. 5d.; and in grants to Local Societies in 1943, £410, 10s. 1d.

Special Grants had been made during the year as follows: Animal Diseases Research Association, £200; Glasgow Veterinary College, £150; Royal Scottish Agricultural Benevolent Institution, £100; Scottish Agricultural Organisation Society, £100; Scottish Red Cross Agriculture Fund, £232, 6s. 5d.; other Grants, £97, 2s.—a total of £879, 8s. 5d.

Thereafter Lord Home moved approval of the following Special Grants, which had been recommended by the Board of Directors:—

- (1) £100 to the Scottish Agricultural Organisation Society for the year 1945.
- (2) £100 to the Royal Scottish Agricultural Benevolent Institution for the year 1945.
- (3) £10 to the Scottish Society for the Prevention of Cruelty to Animals.

Mr James Durno, Crichtie, Inverurie, seconded, and the Accounts were then adopted and the Special Grants unanimously approved.

At a later stage in the proceedings, Mr Peter Gordon, Balcraig Moor, reverted to the Special Grant of £200 made by the Society to the Animal Diseases Research Association, and asked whether, in view of the great amount of research work which was being undertaken by that Association into mastitis and other serious diseases among animals, members were agreed that £200 was a big enough grant to make to the Association. He would suggest that by another year they might make it something more.

Sir Joshua Ross-Taylor thought that Mr Gordon should appeal to farmers in general throughout Scotland to support the Association by becoming members before he asked the Highland Society to give an increased grant. The membership of the Association was nothing like what it should be.

Mr A. W. Montgomerie, O.B.E., said that grants had been given on a national scale for mastitis research, and he thought that was why more had not been allocated by the Society. The Society had a great many members in dairying, although they were very poorly represented on the Board. Many dairy farmers felt that the Society was not at all interested in them. Dairying, as they had seen during the war, was No. 1 industry in the production of food. He thought the Society should try to do a little more for that industry, and they should try to get more members from the dairy industry to support the Animal Diseases Research Association.

On the suggestion of the President, the matter was referred to the Board of Directors for consideration.

Argyll Naval Fund.

Mr James R. Lumsden of Arden, Convener of the Committee of the Argyll Naval Fund, submitted the report on the Fund for the year ended 30th November 1944. The income from the Fund for the year amounted to £343, 13s. 6d., while the expenditure comprised one grant of £50, two grants of £30, and one of £20 to Naval Cadets—a total of £130.

He added that several vacancies were still waiting to be filled, and if any member knew of any suitable candidate, full particulars could be obtained from the Secretary. The annual allowance to beneficiaries under the Fund had now been increased from £40 to £60.

Mr Lumsden said it seemed that very few young men from the Highlands were going into the Navy these days. One of the qualifying conditions in making application for benefit was that applicants must have a Highland connection.

Scottish Red Cross Agriculture Fund.

The Secretary reported that at the close of its fourth year of activities, on 16th April 1944, the Fund stood at £549,104, 0s. 11d. Since that date further sums amounting to £66,168, 5s. 4d. had been received, comprising:—

Free Gift Sales, Levies, and Collections by Area Committees	£49,889	10	3
Victory Garden Shows and Sales	7,486	1	10
Farm Workers' Penny-a-Week Contributions	246	11	10
Other Contributions	8,546	1	5
	£66,168	5	4

Adding that amount to the total of the previous four years gave a grand total of £615,272, 6s. 3d. contributed by Scottish Agriculturists for the merciful work of the Red Cross during the past 4½ years.

That represented a considerable increase as compared with the total of the corresponding period of a year ago. It was principally accounted for by the receipt of a magnificent donation of £20,224 from the Stewartry Committee as a result of their Free Gift Sale at Castle-Douglas. Two years ago that Committee had sent a contribution of £13,000, which at that time established a record. By their latest donation a new record has been created which would not readily be surpassed.

Other exceptionally fine contributions had been made by Committees at Aberfeldy, £4474; Peebles, £3488; St Boswells, £3100; Biggar, £2886; Duns, £2523; and Lockerbie, £1199. From Aberdeenshire several notable donations had been received—a first instalment of £1000 from Aberdeen Area Committee; Maud, £2711; Methlick, £2250; Vale of Alford, £948; Deeside, £677; Torphins, £417; and Cromar and Upper Deeside, £254. From the West a welcome donation of £794 was made by the Arran Branch of the N.F.U. and Chamber of Agriculture, and Mid-Argyll Agricultural Society had made an allocation of £270. Dundee and District Committee sent in a further balance of £798; Langholm, £670; and Newcastleton, £412. From the War Schemes Fund of the Lord Lieutenant of Wigtownshire an appreciated grant had been made of £1000, as also one of £350 from the County of Dumbarton War Benevolent Fund.

These substantial donations, received in the earlier part of the financial year, were evidence of continuing and sustained enthusiasm by Scottish farmers for the cause of the Red Cross. It was known that many of the Area Committees were actively engaged in renewed efforts for the current season, and it was the hope of the Committee that the substantial and highly successful results achieved by them in preceding years would not only be maintained but possibly exceeded.

Victory Garden Shows.—Victory Garden Shows and Sales had been continued—for the fourth season—with unabated vigour, and the general tendency had been to enlarge the scope of these efforts. The amount received from that source to date was £7486, 1s. 10d., and the proceeds of several Shows had yet to come to hand. There was every likelihood, therefore, that when all the current returns had been received, the excellent total raised in the previous season would be exceeded.

A remarkable achievement was that of the Ballantrae Committee, which had raised a sum of no less than £966 through various enterprises. A further outstanding return was that of £611 made by the Bonnybridge Association. The Royal Caledonian Horticultural Society and the Longcroft (Stirlingshire) Committee had each raised £400; Parkhead and Sighthill Society (Edinburgh), £340; Leven and district, £310; and Oban, £300.

Other Contributions.—In addition to supporting the Fund individually and otherwise, the members of the Scottish Shorthorn Breeders' Association had made a handsome gift of £840 as the result of Sales of Stock at various centres. From the Highland Cattle Society of Scotland a donation of £206 was received, which had been raised in a similar manner. Young Farmers' Clubs had given notable service to the Fund—a most striking contribution being one of £700 from the East Kilbride Club, while from the West of Fife Club there had been received the excellent sum of £334. A highly valued donation was that of £500 from the Strathaven and District Agricultural Exposition. Many other interesting and welcome contributions had been made, of which full details would be given in due course in the Annual Report.

On the whole, the rate and strength of present contribution suggested that the final total for the fifth financial year ending 16th April next would be as gratifying as the record total of the previous year. To ensure that desirable result, however, it was essential that the efforts still to be made within the next three months should be fully maintained and even intensified. The Committee of the Fund appealed, therefore, to the Directors and members of the Society to give all possible support to make sure that their own Fund of the Red Cross would continue to go forward in ever greater strength.

The Earl of Home, K.T., Chairman of the Fund, said that his Committee were profoundly grateful for the amazing generosity of all Agriculturists in Scotland towards the merciful work of the Red Cross during the past 4½ years.

Lochiel said he thought that everyone engaged in farming in Scotland—whether he were farmer, ploughman, shepherd, or other worker—could well be proud of what had been achieved. At the same time he hoped their efforts on behalf of the Fund would not in any way diminish, because the Red Cross needed more and more money every day. He knew that the Red Cross authorities were deeply grateful for what Agriculturists in Scotland had contributed to their Funds.

Grants to Local Societies.

Mr James Paton, Kirkness, Glencairn, reported that four years ago the Directors decided that all grants by the Society of money or medals in aid of Local Agricultural Shows be suspended for the duration of the war. In consequence of that decision, therefore, the grants made by the Society for 1944 were largely restricted to Horse-breeding Associations in Scotland, and a sum of £120 had been expended during the year in respect of such grants. Special grants to Federations of Scottish Women's Rural Institutes and for Allotments Competitions amounted to £47, 19s. 7d., and the cost of Ploughing,

Hoeing, and Long Service Awards was £181, 0s. 1d.—making a total expenditure of £348, 19s. 8d. for the year 1944.

The issue of Gold Medals for Long Service had also been temporarily suspended during the war, but applicants would be entitled, in the meantime, to the appropriate Certificates, and would be eligible to receive the Gold Medals when these became available.

For the year 1945 the Directors had confirmed the following grants: six Horse-breeding Associations for grants of £15 each in respect of Stallions engaged; £15 and fifteen Silver Medals to the Scottish National Union of Allotment Holders for Allotments Competitions; two Silver Medals to the Scottish Gardens and Allotments Committee for National Allotments Competition; various special grants to Federations of Scottish Women's Rural Institutes; and the usual awards for Long Service, &c.; six further grants of £15 each had been made that day to Horse-breeding Associations—so that the total estimated expenditure in 1945 for all grants was £472, 10s.

Mr J. Milne Henderson, C.A., Edinburgh, suggested that the time had come when the Society should consider the question of giving special grants to smallholders. He also suggested that in view of the importance of milk to the nation the Society might consider the matter of giving special grants for milk stock at local shows.

The Chairman, Mr Lumsden, said it could be left to the Shows Committee to consider whether any alteration should be made in the nature of the grants given to local societies. These grants had been in abeyance, however, during the war. When they were renewed after the war, the question of prizes for milk stock, as well as fat stock, could be considered. Mr Milne Henderson's suggestion with regard to grants to smallholders would also come before that Committee.

Education.

National Diploma in Agriculture.—Sir Joshua Ross-Taylor, Convener of the Education Committee, submitted the following report on the Forty-seventh Examination for the National Diploma in Agriculture held in July 1944:—

In view of representations made, it had been decided, in order to assist candidates at the English and Welsh Colleges, and to meet the special circumstances, to hold two Examinations in 1944—the one at Edinburgh during April for Scottish and other students, and the other at Leeds in July for English and Welsh students.

A full Report on the Examination held at Edinburgh had been given at Meetings held here on 7th June last.

At the Examination held at Leeds from 12th to 21st July, 216 candidates had appeared. As a result of the Examination 51 Diplomas were awarded. One Honours award had been made, the candidate being a student of Reading University. Of the 216 candidates, 14 had appeared for all subjects, and of these, 7 obtained the Diploma, including the candidate with the Honours award. 66 had passed certain subjects previously, and were completing the Examination on that occasion, and of these, 41 were successful in obtaining the Diploma. The names of the successful candidates would appear in the next volume of the 'Transactions.'

The remaining 136 had presented themselves for first groups of three, four, or five subjects, and of these, 59 passed in the subjects for which they had appeared, and would be entitled to appear for the second group of subjects at a subsequent Examination.

The number of candidates forward for the Examination in 1944—82 at Edinburgh and 216 at Leeds, in all, 298—constituted a record entry.

With reference to the Examinations to be held in 1945, it might be added that, as a special measure, two Examinations would again be held—the first at Edinburgh in April, and the second at Leeds in July.

National Diploma in Dairying.—Sir Joshua Ross-Taylor also submitted a Report on the Examination for the National Diploma in Dairying held in September 1944.

The Forty-ninth Annual Examination for the National Diploma in Dairying took place during September at the Dairy School for Scotland, Auchincruive, Ayr, for Scottish students, and at the University and British Dairy Institute, Reading, for English and Welsh students.

At the Auchincruive Centre 49 candidates had presented themselves—34 candidates appeared for all subjects and 7 candidates for re-examination in certain subjects in which they had previously failed. 26 candidates obtained the Diploma. In addition, 8 candidates appeared for Part I. of the Examination.

At the Reading Centre 65 candidates had presented themselves—48 taking the whole Examination and 17 for re-examination in certain subjects in which they had failed to pass previously. 36 candidates obtained the Diploma.

The names of the successful candidates would appear in the next volume of the 'Transactions.'

Of those candidates who failed, 6 at Auchincruive and 22 at Reading failed in not more than three subjects, and these would be permitted, after further study, to reappear at the next Examination for the subjects in which they had failed. Of those taking Part I. group of subjects at the Auchincruive Examination, 2 failed in one subject, for which they would be permitted to reappear at the next Examination in conjunction with Part II. group of subjects.

Sir Joshua added that more than one examiner in subsequent Reports on the Examination had stressed the fact that a number of the students were distinctly deficient in secondary education. It was most unfortunate that such students should be allowed to go forward for the Examination. It was a disappointment to them, and added very much to the work of those who examined them and of the officials of the Society who depended on the heads of the Institutes or Colleges to keep them right with regard to the attainments of the students.

General.

Mr James R. Lumsden, Chairman of Directors, reported that, since the Half-yearly Meeting held on 7th June 1944, other matters which had engaged the attention of the Board of Directors were:—

Agricultural Education.—On 8th June representatives of the Society had appeared before Lord Alness's Committee on Agricultural Education in Scotland, when they gave evidence in support of a Memorandum which had been submitted on behalf of the Society.

Implement Demonstration.—Mr Lumsden said that arrangements had been made for a Demonstration and Exhibition of New Implements to be held at Almond Hill, Kirkliston, on 6th and 7th September 1944. On 3rd August, however, it was decided to abandon the proposed Demonstration and Exhibition on account of insufficient entries. While a few implements had been entered, only one Combine Harvester and no Potato Harvester had been entered. The Directors felt that to have held the Demonstration and Exhibition under these circumstances would not have served the purpose for which it was intended, and it had been decided accordingly to abandon it.

Proposed Experimental Station for Agricultural Implements and Machinery.—On 1st November the Directors decided to approach the Department of Agriculture with a suggestion that steps be taken to institute an Experimental Station for Agricultural Implements and Machinery in Scotland. There was an Institute of Agricultural Engineering at Askham Bryan, York, but it was understood that the Institute's tenure of its present buildings and land would soon expire and that the Institute might be moved to the South of England. That meant that few, if any, Scottish farmers would be able to get in touch with the Institute.

Such a Station in Scotland would provide facilities for trying out new implements and machines under conditions prevailing in Scotland, thus providing farmers with opportunities for judging the suitability of these implements and machines for use on Scottish farms. The Station would also provide facilities for training young farm-workers in the use and maintenance of farm tractors and the adjustment and control of the implements to be used with them.

The Department of Agriculture had indicated that they were in sympathy with the suggestion, and had invited representatives of the Society to attend a Meeting to discuss the proposal.

Post-war Wool Marketing.—On 12th October representatives of the Society attended a Conference on the subject of Post-war Wool Marketing convened by the Scottish Agricultural Organisation Society Ltd. A full discussion took place at the Meeting, which generally favoured the setting up of a Wool Marketing Board for Scotland, and a small Committee had been appointed to go into the matter and prepare a report for a further Meeting.

Seed Potato Trade.—In July the Department of Agriculture for Scotland forwarded copy of a Memorandum on the Post-war Reconstruction of the Seed Potato Trade, prepared by the National Association of Seed Potato Merchants. The Department stated they would be glad to have the observations of the Society thereon.

Comments on the Memorandum had been prepared by Mr James Paton, Kirkness, Glencraig, and Mr W. D. Simpson, Highfield, North Berwick. These comments had been submitted to, and were approved by, the Board of Directors, and subsequently forwarded to the Department of Agriculture.

First Post-war Show at Inverness.—In this connection Mr Lumsden said that on 1st November Major R. F. Brebner had reported on inquiries which had been made as to the possibility of getting timber and transport for a Show at Inverness in 1946. Major Brebner had then reminded the Board that it had been decided that the first post-war Show should take place at that centre. With Sir Joshua Ross-Taylor and the Secretary, Major Brebner had interviewed officials of the Timber Control Department of the Ministry of Supply and officials of the Ministry of War Transport. The Timber Control officials, while they could give no guarantee, agreed that there should be no difficulty in obtaining the necessary timber in 1946. The Transport officials did not foresee any undue difficulties with respect to transport.

With regard to the showground at The Bughts, Inverness, Mr Walker of Leys had reported that a good deal of it had been ploughed up. Of the 49 acres of the showyard, 28 acres were under cultivation, while 8 of the 18 acres of the car park were also under cultivation. Mr Walker informed them that the Provost and Councillors of Inverness were alive to the situation, and were going to get the land put back into grass at the earliest possible moment so as to be fit for the Show in 1946.

Reconditioning of Rural Housing.—Continuing, Mr Lumsden said the Society had been asked to give evidence on the reconditioning of rural housing, and a small Committee of the Directors had been appointed that day to prepare evidence.

"Summer Time."—Mr Lumsden also referred to a resolution which had been adopted by the Directors protesting against the difficulties caused to farmers by Double Summer Time and Single Summer Time in winter. He said it had been remitted to a small Committee to draw up a letter of strong protest and forward it to the Government.

Question as to further Demonstrations of Implements.—The Earl of Mansfield asked whether the Society intended to hold any further demonstrations of implements, and particularly of mechanical draining apparatus.

Sir Joshua Ross-Taylor, Convener of the Implements and Machinery Committee, replied that the Society had no such intention at present. The Directors had decided that it was unfair to apply to any individual farmer to hand over his farm for the matter of several days at a busy time. They had turned their attention to a proposal that an implements station or institute be set up in Scotland such as was in existence at Askham Bryan in Yorkshire. The chief reason why that was suggested was that the Askham Bryan station was being removed farther south, and that, in consequence, it would be impossible for many Scottish farmers to attend and see the work that was going on there.

As to the point raised by Lord Mansfield with regard to drainage machines, Sir Joshua said that if any farmer knew of a certain drainage machine he might get into touch with the maker and ask him to give a local demonstration. That, of course, would only take them so far; they would not be able to compare it with other machines to see whether it was the best of its type.

Science.

Report by Chemist.—There was submitted on behalf of Dr J. F. Tocher, Consulting Chemist to the Society, a brief summary of the results of analyses made by him, and comments on the results, for 1944. The substance of the Report appears on pp. 96-100 of this volume.

Vote of Thanks.

On the motion of Sir Joshua Ross-Taylor a vote of thanks was accorded to Lochiel for presiding. In doing so he referred to the prospect of holding the 1946 Show of the Society at Inverness, and expressed the hope that the President would use his influence with the Provost and Council of Inverness to see that the site for the Show was sown out in grass at the earliest possible date.

In thanking the Meeting, Lochiel added that he would do his utmost in the matter to which Sir Joshua had referred.

APPENDIX

PREMIUM BOOK

OF

THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND

1945

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Address for communications:

JOHN STIRTON, O.B.E., Secretary,
The Highland and Agricultural Society of Scotland,
8 Eglinton Crescent,
Edinburgh 12.

GENERAL NOTICE.

THE HIGHLAND SOCIETY was instituted in the year 1784, and incorporated by Royal Charter in 1787. Its operation was at first limited to matters connected with the improvement of the Highlands of Scotland; but the supervision of certain departments, proper to that part of the country, having been subsequently committed to special Boards of Management, several of the earlier objects contemplated by the Society were abandoned, while the progress of agriculture led to the adoption of others of a more general character. The exertions of the Society were thus early extended to the whole of Scotland, and have since been continuously directed to the promotion of the science and practice of agriculture in all its branches.

In accordance with this more enlarged sphere of action, the original title of the Society was altered, under a Royal Charter, in 1834, to THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND.

The Society avoids questions of political controversy, but in other public matters of practical concern to agriculture it seeks to guard and promote, by every means in its power, the welfare of all interested in the agriculture of Scotland.

Among the more important measures which have been effected by the Society are—

1. Agricultural Meetings and General Shows of Stock, Implements, &c., held in the principal towns of Scotland, at which exhibitors from all parts of Great Britain, Northern Ireland, and Eire (Irish Free State) are allowed to compete.

2. A system of District Shows instituted for the purpose of improving the breeds of Stock most suitable for different parts of the country, and of aiding and directing the efforts of Local Agricultural Societies and Associations.

3. A scheme of Awards to Farm Workers for long and approved service in Scotland.

4. The encouragement of Agricultural Education, under powers conferred by a supplementary Royal Charter, granted in 1856, and authorising the Society to grant Diplomas to Students of Agriculture, and by giving grants in aid of education in Agriculture and allied sciences. In 1900 the Society discontinued its own Examination, and instituted jointly with the Royal Agricultural Society of England an Examination for a National Diploma in Agriculture.

5. The institution of an Examination for a National Diploma in Dairying, jointly with the Royal Agricultural Society of England and the British Dairy Farmers' Association.

6. The institution of an Examination in Forestry for First and Second Class Certificates. Terminated in 1935 in accordance with arrangements made with the Royal Scottish Forestry Society.

7. The advancement of the Veterinary Art, by conferring Certificates on Students who have passed through a prescribed curriculum, and who are found, by public examination, qualified to practise. Terminated in 1881 in accordance with arrangements made with the Royal College of Veterinary Surgeons.

8. The appointment of a Chemist for the purpose of promoting the application of science to agriculture.

9. The establishment of a Botanical Department.

10. The appointment of an Entomologist to advise members regarding insect pests, &c.

11. The annual publication of the 'Transactions,' comprehending papers by selected writers, Prize Reports, and reports of experiments, also an abstract of the business at Board and General Meetings, and other communications.

12. The management of a fund left by John, 5th Duke of Argyll (the original President of the Society), to assist young natives of the Highlands who enter His Majesty's Navy.

CONSTITUTION AND MANAGEMENT.

The general business of THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND is conducted under the sanction and control of the Royal Charters, referred to above, which authorise the enactment of Bye-Laws.

The Office-Bearers consist of a President, Four Vice-Presidents, Thirty-two Ordinary and Twenty Extraordinary Directors, a Treasurer, an Honorary and an Acting Secretary, an Auditor, and other Officers.

The Supplementary Charter of 1856 provides for the appointment of a Council on Education, consisting of Sixteen Members—Nine nominated by the Charter and Seven elected by the Society.

STATEMENT OF PRIVILEGES OF MEMBERS.

MEMBERS OF THE SOCIETY ARE ENTITLED—

1. *To receive a free copy of the 'Transactions' annually.*
2. *To apply for District Premiums that may be offered, and for Long Service Awards for Agricultural Employees.*
3. *To report Ploughing Matches for Medals that may be offered.*
4. *To Free Admission to the Shows of the Society.*
5. *To exhibit Live Stock and Implements at reduced rates.*

Firms are not admitted as Members; but if one partner of a firm becomes a Member the firm is allowed to exhibit at Members' rates.

6. *To have Fertilisers and Feeding-Stuffs, &c., analysed at reduced fees.*
7. *To obtain Reports on the Animal Enemies of Crop Plants and Live Stock (including Poultry).*
8. *To attend and vote at General Meetings of the Society.*
9. *To vote for the Election of Directors.*
d.c., &c

ANALYSES OF FERTILISERS AND FEEDING-STUFFS, &c.

The scale of Fees in respect of Analyses made by the Society's Chemist for Members of the Society will be found under "Chemical Department."

Valuations of manures, according to the Society's scale of units, will be supplied on application being made.

For further particulars, see under Chemical Department.

Chemist.—Mr J. F. TOCHER, D.Sc., LL.D., F.I.C., Crown Mansions, 41½ Union Street, Aberdeen.

REPORTS ON THE ANIMAL ENEMIES OF CROP PLANTS AND LIVE STOCK (INCLUDING POULTRY).

The Consulting Zoologist is prepared to send to any Member of the Society a Report on damage to, or diseases of, plants and animals due to animal agency (Insects, Mites, Worms, Snails, Slugs, Birds, and the Smaller Mammals).

For further particulars, see under Entomological Department.

Consulting Zoologist.—Mr A. E. CAMERON, M.A., D.Sc., Department of Agricultural and Forest Zoology, University of Edinburgh, 10 George Square, Edinburgh.

TERMS OF MEMBERSHIP, &c.

The influence and usefulness of the Society depend mainly upon its strength in membership. The Members, through the Directors whom they elect, have the practical control of the affairs of the Society. The stronger the body of Members, the greater will be the usefulness of the Society. It will therefore be to both their own and the public advantage if all who are interested in agriculture, and who are not already enrolled, should at once become Members of the Society.

ELECTION OF MEMBERS.

Candidates for admission to the Society must be proposed by a Member, and are elected at the half-yearly General Meetings in January and June. It is not necessary that the proposer should attend the Meeting.

RATES OF SUBSCRIPTION.

HIGHER SUBSCRIPTION.

The ordinary annual subscription is £1, 3s. 6d., and the ordinary subscription for life-membership is £12, 12s.; or after ten annual payments have been made, £7, 7s.

LOWER SUBSCRIPTION.

Proprietors farming the whole of their own lands, whose rental on the Valuation Roll does not exceed £500 per annum, and all Tenant-Farmers, Secretaries or Treasurers of Local Agricultural Associations, Factors resident on Estates, Land Stewards, Foresters, Agricultural Implement Makers, Grain, Seed and Manure Merchants, Agricultural Auctioneers, Cattle Dealers and Veterinary Surgeons, none of them being also owners of land to an extent exceeding £500 per annum, and such other persons as, in respect of their official or other connection with agriculture, the Board of Directors may consider eligible, are admitted on a subscription of 10s. annually, which may be redeemed by one payment of £7, 7s., and after eight annual payments of 10s. have been made, a Life Subscription may be purchased for £5, 5s., and after twelve such payments, for £3, 3s.

It must be stated, on behalf of Candidates claiming to be admitted at the Lower Rate of Subscription (10s.), under which of the above designations they are entitled to be admitted at the Lower Rate.

Subscriptions are payable on election, and afterwards annually in January.

According to the Charter, a Member who shall not have objected to his election, on the same being intimated to him by the Secretary, cannot retire until he has paid, in annual subscriptions or otherwise, an amount equivalent to a life composition.

Members are requested to send to the Secretary the names and addresses of Candidates proposed for admission to the Society, at the same time stating whether the Candidates should be admitted at the £1, 3s. 6d. or 10s. rate.

Patron of the Society.—HIS MAJESTY THE KING.

OFFICERS AND DIRECTORS FOR 1944-1945.

President.

Sir DONALD W. CAMERON OF LOCHIEL, K.T., Achnacarry, Spean Bridge,
Inverness-shire.

Vice-President.

THE DUKE OF SUTHERLAND, K.T., P.C., Dunrobin Castle, Golspie.
THE EARL OF LEVEN AND MELVILLE, K.T., Glenferness House, Nairn.

Year of
Election.

Ordinary Directors.

- | | | |
|--|---|--|
| 1941 | { | ROBERT W. MEIKLE, Hardengreen, Dalkeith (<i>elected 5th January 1944</i>). |
| | | JAMES WYLLIE, Beaumont, Victoria Road, Dumfries. |
| | | JOHN KERR, Yorkston, Gorebridge, Midlothian |
| | | RALPH S. MACWILLIAM, Garguston, Muir of Ord, Ross-shire
(<i>elected 3rd June 1942</i>). |
| | | A. W. HOWISON, Rannagulzion, Blairgowrie. |
| 1942 | { | A. A. HAGART SPEIRS of Elderslie, Houston House, Renfrewshire. |
| | | Captain R. J. THOMSON, Kames, West Linton (<i>elected 7th June 1944</i>). |
| | | J. W. ALEXANDER, M.V.O., of Newton, Golfhill, Moffat (<i>elected 5th January 1944</i>). |
| | | W. J. CAMPBELL, 61 Fountainhall Road, Edinburgh. |
| | | FRANCIS W. WALKER of Leys, Leys Castle, Inverness. |
| | | WILLIAM H. LAWSON, Frithfield, Anstruther. |
| | | WILLIAM BROWN, Craigton, Bishopton, Renfrewshire. |
| | | JOHN N. REID, Cromley Bank, Ellon. |
| | | Sir JOSHUA ROSS-TAYLOR, Mungoswalls, Duns. |
| | | J. E. KERR of Harviestoun, Dollar. |
| 1943 | { | WILLIAM D. SIMPSON, Highfield, North Berwick. |
| | | IAN M. CAMPBELL, Bal Blair, Invershin, Sutherland. |
| | | THE EARL OF ELGIN AND KINCARDINE, K.T., C.M.G., Broomhall, Dunfermline. |
| | | A. W. MONTGOMERIE, O.B.E., Westburn Farm, Cambuslang. |
| | | ALEXANDER FORBES, Rettie, Banff. |
| | | R. SCOTT AITON, M.C., Legerwood, Earlston. |
| 1944 | { | Captain JAMES CRAIG, Gwydyr House, Comrie Road, Crieff. |
| | | JAMES WITHER, Awhiik, Stranraer. |
| | | Captain IAN S. ROBERTSON, Linkwood, Elgin. |
| | | JOHN NIVEN, Glogaburn, Tibbermore. |
| | | JAMES CLARK, Windlaw Farm, Carmunnock. |
| | | JAMES Durno, Criche, Inverurie |
| | | MATTHEW TEMPLETON, Goshen Bank, Kelso. |
| | | JAMES JOHNSTON, Dunmore Home Farm, Falkirk. |
| WILLIAM MONTGOMERY, North Milton, Kirkcudbright. | | |
| WILLIAM ALLISON, Almond Hill, Kirkliston. | | |

Year of
Election.

Extraordinary Directors.

- | | | | |
|------|---|--|-----------------------------------|
| 1943 | { | ALEXANDER CLARK, Strathore House, Thornton, Fife. | |
| | | PETER GORDON, Balcraig Moor, Port William. | |
| | | GEORGE GRANT of Glenfarclas, Blacksboat. | |
| | | THOMAS HUTCHISON (Barclay, Ross & Hutchison, Ltd.), 67-71 Green, Aberdeen. | |
| | | JAMES KILPATRICK, Craigie Mains, Kilmarnock. | |
| 1944 | { | FINLAY MACGILLIVRAY, Greenhead, Pencaitland, East Lothian. | |
| | | Major R. F. BREBNER, C.B.E., The Leuchold, Dalmeny House, Edinburgh. | |
| | | JAMES R. LUMSDEN of Arden, Dumbartonshire. | |
| | | { | JAMES PATON, Kirkness, Glencraig. |

Chief Officials, &c.

THE EARL OF HOME, K.T., The Hirsell, Coldstream, *Treasurer*.
 ALEXANDER MURDOCH, East Hallside, Cambuslang, *Honorary Secretary*.
 JOHN STIRTON, O.B.E., 8 Eglinton Crescent, Edinburgh, *Secretary*.
 THOMAS W. RUSSELL, *Chief Clerk*.
 JOHN WATT, *Second Clerk*.
 GEORGE JAMES GREGOR, C.A., 8 York Place, Edinburgh, *Auditor*.
 J. F. TOCHER, D.Sc., LL.D., F.I.C., 41½ Union Street, Aberdeen, *Chemist*.
 *Master of Works*.
 A. E. CAMERON, M.A., D.Sc., University of Edinburgh, 10 George Square, Edinburgh, *Consulting Zoologist*.
 The Very Rev. CHARLES L. WARR, D.D., 63 Northumberland Street, Edinburgh, *Chaplain*.
 TODS, MURRAY & JAMIESON, W.S., 66 Queen Street, Edinburgh, *Law Agents*.
 WILLIAM BLACKWOOD & SONS LTD., 45 George Street, Edinburgh, *Publishers*.
 HAMILTON & INCHES, Princes Street, Edinburgh, *Silversmiths*.
 ALEXANDER KIRKWOOD & SON, 9 St James' Square, Edinburgh, *Medallists*.
 JOHN MENZIES & Co. LTD., 6 Castle Street, Edinburgh, *Advertising Agents*.
 FRANK REID, 55 Blenheim Place, Aberdeen, *Showyard Erector*.
 J. P. LAUDER, *Officer and Caretaker*.

Chairman of Board of Directors.

JAMES R. LUMSDEN of Arden, Dumbartonshire.

Chairmen of Committees.

- | | |
|-------------------------------------|--|
| 1. Argyll Naval Fund . . . | JAMES R. LUMSDEN of Arden, Dumbartonshire. |
| 2. Finance, Chambers, and Law . . . | The EARL OF HOME, K.T., The Hirsell, Coldstream. |
| 3. Publications . . . | Major R. F. BREBNER, C.B.E., The Leuchold, Dalmeny House, Edinburgh. |
| 4. Shows . . . | IAN M. CAMPBELL, Bal Blair, Invershin. |
| 5. Implements and Machinery . . . | Sir JOSHUA ROSS-TAYLOR, Mungoswalls, Duns. |
| 6. Science . . . | J. W. ALEXANDER, M.V.O., of Newton, Golfhill, Moffat. |
| 7. General Purposes . . . | JAMES R. LUMSDEN of Arden, Dumbartonshire. |
| 8. Education . . . | Sir JOSHUA ROSS-TAYLOR, Mungoswalls, Duns. |
| 9. Office-bearers . . . | JAMES R. LUMSDEN of Arden, Dumbartonshire. |

COMMITTEES FOR 1944-1945.

1. ARGYLL NAVAL FUND.

JAMES R. LUMSDEN of Arden, Dumbartonshire, *Convener*.
 Major R. F. BREBNER, C.B.E., The Leuchold, Dalmeny House, Edinburgh.
 Sir GEORGE I. CAMPBELL of Succoth, Bt., Crarae Lodge, Minard, Argyll.
 IAN M. CAMPBELL, Bal Blair, Invershin.
 Captain JAMES CRAIG, Gwydyr House, Comrie Road, Crieff.
 JAMES DURNO, Crichtie, Inverurie.
 The EARL OF ELGIN AND KINCARDINE, K.T., C.M.G., Broomhall, Dunfermline.
 J. E. KERR of Harviestoun, Dollar.
 ALEXANDER MURDOCH, East Hallside, Cambuslang.
 Sir JOSHUA ROSS-TAYLOR, Mungoswalls, Duns.
 The EARL OF HOME, K.T., The Hirsell, Coldstream, Treasurer, *ex officio*.

2. FINANCE, CHAMBERS, AND LAW.

The EARL OF HOME, K.T., The Hirsell, Coldstream, Treasurer, *Convener*.
 J. W. ALEXANDER, M.V.O., of Newton, Golihill, Moffat.
 Major R. F. BREBNER, C.B.E., The Leuchold, Dalmeny House, Edinburgh.
 IAN M. CAMPBELL, Bal Blair, Invershin.
 JAMES DURNO, Crichtie, Inverurie.
 GEORGE GRANT of Glenfarclas, Blacksboat.
 J. E. KERR of Harviestoun, Dollar.
 JAMES R. LUMSDEN of Arden, Dumbartonshire.
 ALEXANDER MURDOCH, East Hallside, Cambuslang.
 JAMES PATON, Kirkness, Glencaig.
 Sir JOSHUA ROSS-TAYLOR, Mungoswalls, Duns.
 FRANCIS W. WALKER of Leys, Leys Castle, Inverness.
 GEORGE JAMES GREGOR, C.A., Auditor, *ex officio*.

3. PUBLICATIONS.

Major R. F. BREBNER, C.B.E., The Leuchold, Dalmeny House, Edinburgh, *Convener*.
 J. W. ALEXANDER, M.V.O., of Newton, Golihill, Moffat.
 IAN M. CAMPBELL, Bal Blair, Invershin.
 JAMES DURNO, Crichtie, Inverurie.
 The EARL OF ELGIN AND KINCARDINE, K.T., C.M.G., Broomhall, Dunfermline.
 GEORGE GRANT of Glenfarclas, Blacksboat.
 J. E. KERR of Harviestoun, Dollar.
 JAMES R. LUMSDEN of Arden, Dumbartonshire.
 A. W. MONTGOMERIE, O.B.E., Westburn Farm, Cambuslang.

WILLIAM MONIGOMERY, North Milton, Kirkcudbright.
 ALEXANDER MURDOCH, East Hallside, Cambuslang.
 JAMES PATON, Kirkness, Glenraig.
 Captain IAN S ROBERTSON, Linkwood, Elgin
 Sir JOSHUA ROSS-TAYLOR, Mungoswalls, Duns
 Captain R J THOMSON, Kaimes, West Linton
 The EARL OF HOME, K T , The Hursel Coldstream, Treasurer, *ex officio*

4. SHOWS.

IAN M CAMPBELL, Bal Blair, Invershin, *Convener*
 JAMES PATON, Kirkness, Glenraig, *Vice-Convener*
 R SCOTT AITON, M.C., Legerwood, Earlstoun
 J W. ALEXANDER, M V O , of Newton, Golffhill, Moffat
 WILLIAM ALLISON, Almond Hill, Kirkliston
 Major R F BREBNER, C B E The Leuchold Dalmeny House, Edinburgh.
 WILLIAM BROWN, Craigton, Bishopton, Renfrewshire
 W. J CAMPBELL, 61 Fountainhall Road, Edinburgh
 ALEXANDER CLARK, Strathore House, Thornton, Fife
 JAMES CLARK, Windlaw Farm Carmunnock
 Captain JAMES CRAIG, Gwydyr House, Comrie Road, Crieff
 JAMES DURNIO, Criche, Inverurie.
 The EARL OF ELGIN AND KINCAIDINE, K T , C M G Broomhall, Dunfermline
 ALEXANDER FORBES Rennie Banff
 PETER GORDON, Balcraig Moor, Port William
 GEORGE GRANT of Glenfarclas, Blackboat
 A W HOWISON, Rannagulzion, Blairgowrie
 THOMAS HURCHISON, 67-71 Green, Aberdeen
 JAMES JOHNSTON, Dunmore Home Farm, Falkirk
 J. E. KERR of Harvestoun Dollar.
 JOHN KERR, Yorkston, Gorebridge, Midlothian
 JAMES KILPATRICK, Craigie Mains, Kilmarnock
 WILLIAM H LAWSON, Frithfield, Anstruther
 JAMES R LUMSDEN of Arden, Dumbartonshire
 FINLAY MACGILLIVRAY, Greenhead, Pencarthland East Lothian
 RALPH S MACWILLIAM, Gaiguston, Muir of Old, Ross shire
 ROBERT W MEIKLE, Hardengreen, Dalkeith
 A W MONTGOMERY, O B E , Westburn Farm, Cambuslang
 WILLIAM MONTGOMERY, North Milton, Kirkcudbright
 ALEXANDER MURDOCH, East Hallside, Cambuslang
 JOHN NIVEN, Gloagburn, Libberton
 JOHN N REID, Cromley Bank, Ellon
 Captain IAN S ROBERTSON, Linkwood, Elgin.
 Sir JOSHUA ROSS-TAYLOR, Mungoswalls, Duns
 WILLIAM D SIMPSON, Highfield, North Berwick
 A A HAGART SPEIRS of Elderslie, Houston House, Renfrewshire.
 MATTHEW TEMPLETON, Goshen Bank, Kelso
 Captain R. J. THOMSON, Kaimes, West Linton
 FRANCIS W WALKER of Leys, Leys Castle, Inverness
 JAMES WITHER, Awhirk, Stranraer
 JAMES WYLLIE, Beaumont, Victoria Road, Dumfries
 The EARL OF HOME, K.T., The Hursel, Coldstream, Treasurer, *ex officio*

5. IMPLEMENTS AND MACHINERY.

Sir JOSHUA ROSS-TAYLOR, Mungoswalls, Duns, *Convener*.
 JAMES PATON, Kirkness, Glencraig, *Vice-Convener*.
 R. SCOTT AITON, M.C., Legerwood, Earlston.
 J. W. ALEXANDER, M.V.O., of Newton, Golfhill, Moffat.
 WILLIAM ALLISON, Almond Hill, Kirkliston.
 JAMES DURN, Crichtie, Inverurie.
 ALEXANDER FORBES, Rettie, Banff.
 PETER GORDON, Balcraig Moor, Port William.
 THOMAS HUTCHISON, 67-71 Green, Aberdeen.
 J. E. KERR of Harviestoun, Dollar.
 JOHN KERR, Yorkston, Gorebridge, Midlothian.
 WILLIAM H. LAWSON, Frithfield, Anstruther.
 FINLAY MACGILLIVRAY, Greenhead, Pencaitland, East Lothian.
 ROBERT W. MEIKLE, Hardengreen, Dalkeith.
 A. W. MONTGOMERIE, O.B.E., Westburn Farm, Cambuslang.
 ALEXANDER MURDOCH, East Hallside, Cambuslang.
 JOHN NIVEN, Gloagburn, Tibberton.
 JOHN N. REID, Cromley Bank, Ellon.
 Captain IAN S. ROBERTSON, Linkwood, Elgin.
 WILLIAM D. SIMPSON, Highfield, North Berwick.
 FRANCIS W. WALKER, of Leys, Leys Castle, Inverness.
 JAMES WITHER, Awhirk, Stranraer.
 JAMES WYLLIE, Beaumont, Victoria Road, Dumfries.
 JAMES R. LUMSDEN of Arden, Dumbartonshire, Chairman of Board of Directors, *ex officio*.
 The EARL OF HOME, K.T., The Hirsell, Coldstream, Treasurer, *ex officio*.

6. SCIENCE.

J. W. ALEXANDER, M.V.O., of Newton, Golfhill, Moffat, *Convener*.
 R. SCOTT AITON, M.C., Legerwood, Earlston, *Vice-Convener*.
 Major R. F. BRENNER, C.B.E., The Leuchold, Dalmeny House, Edinburgh.
 WILLIAM BROWN, Craigton, Bishopston, Renfrewshire.
 IAN M. CAMPBELL, Bal Blair, Invershin.
 W. J. CAMPBELL, 61 Fountainhall Road, Edinburgh.
 ALEXANDER CLARK, Strathore House, Thornton, Fife.
 Captain JAMES CRAIG, Gwydyr House, Comrie Road, Crieff.
 JAMES DURN, Crichtie, Inverurie.
 The EARL OF ELGIN AND KINCARDINE, K.T., C.M.G., Broomhall, Dunfermline.
 GEORGE GRANT of Glenfarclas, Blacksoat.
 A. W. HOWISON, Rannagulzion, Blairgowrie.
 J. E. KERR of Harviestoun, Dollar.
 JAMES KILPATRICK, Craigie Mains, Kilmarnock.
 JAMES R. LUMSDEN of Arden, Dumbartonshire.

FINLAY MACGILLIVRAY, Greenhead, Pencaitland, East Lothian.
 RALPH S. MACWILLIAM, Garguston, Muir of Ord, Ross-shire.
 A. W. MONTGOMERIE, O.B.E., Westburn Farm, Cambuslang.
 WILLIAM MONTGOMERY, North Milton, Kirkcudbright.
 ALEXANDER MURDOCH, East Hallside, Cambuslang.
 JAMES PATON, Kirkness, Glencraig.
 Sir JOSHUA ROSS-TAYLOR, Mungoswalls, Duns.
 WILLIAM D. SIMPSON, Highfield, North Berwick.
 A. A. HAGART SPEIRS of Elderslie, Houston House, Renfrewshire.
 MATTHEW TEMPLETON, Goshen Bank, Kelso.
 Captain R. J. THOMSON, Kaimes, West Linton.
 FRANCIS W. WALKER of Leys, Leys Castle, Inverness.
 JAMES WITHER, Awhirk, Stranraer.
 JAMES WYLLIE, Beaumont, Victoria Road, Dumfries.
 The EARL OF HOME, K.T., The Hirsell, Coldstream, Treasurer, *ex officio*.
 J. F. TOCHER, D.Sc., LL.D., F.I.C., 41½ Union Street, Aberdeen, Chemist,
ex officio.
 A. E. CAMERON, M.A., D.Sc., University of Edinburgh, 10 George Square,
 Edinburgh, Consulting Zoologist, *ex officio*.

7. GENERAL PURPOSES.

JAMES R. LUMSDEN of Arden, Dumbartonshire, Chairman of Board of
 Directors, *Convener*.
 R. SCOTT AITON, M.C., Legerwood, Earlston.
 J. W. ALEXANDER, M.V.O., of Newton, Golfhill, Moffat.
 WILLIAM ALLISON, Almond Hill, Kirkliston.
 Major R. F. BREBNER, C.B.E., The Leuchold, Dalmeny House, Edinburgh.
 W. J. CAMPBELL, 61 Fountainhall Road, Edinburgh.
 ALEXANDER CLARK, Strathore House, Thornton, Fife.
 JAMES Durno, Crichton, Inverurie.
 The EARL OF ELGIN AND KINCARDINE, K.T., C.M.G., Broomhall, Dun-
 fermeline.
 JAMES JOHNSTON, Dunmore Home Farm, Falkirk.
 J. E. KERR of Harviestoun, Dollar.
 ALEXANDER MURDOCH, East Hallside, Cambuslang.
 JAMES PATON, Kirkness, Glencraig.
 Sir JOSHUA ROSS-TAYLOR, Mungoswalls, Duns.
 WILLIAM D. SIMPSON, Highfield, North Berwick.
 MATTHEW TEMPLETON, Goshen Bank, Kelso.
 Captain R. J. THOMSON, Kaimes, West Linton.
 The EARL OF HOME, K.T., The Hirsell, Coldstream, Treasurer, *ex officio*.

8. EDUCATION.

Sir JOSHUA ROSS-TAYLOR, Mungoswalls, Duns, *Convener*.
 Major R. F. BREBNER, C.B.E., The Leuchold, Dalmeny House, Edinburgh.
 JAMES R. LUMSDEN of Arden, Dumbartonshire.
 ALEXANDER MURDOCH, East Hallside, Cambuslang.
 JAMES PATON, Kirkness, Glencraig.
 JOHN STIRTON, O.B.E., 8 Eglinton Crescent, Edinburgh.

9. OFFICE-BEARERS.

Constitution : (1) The four Ordinary Directors for the Division in which the Show for the year is to be held (with the exception of one retiring next year) ; (2) one Ordinary Director from each of the other Show Divisions ; and (3) the Chairman of the Board, Treasurer, and Hon. Secretary, *ex officio*.

Perth . JOHN NIVEN, Gloagburn, Tibbermore.
Glasgow . WILLIAM BROWN, Craigton, Bishopston, Renfrewshire.
Aberdeen . JAMES DURN, Crichton, Inverurie.
Borders . Sir JOSHUA ROSS-TAYLOR, Mungoswalls, Duns.
Stirling . J. E. KERR of Harviestoun, Dollar.
Dumfries . J. W. ALEXANDER, M.V.O., of Newton, Golfhill, Moffat.
Edinburgh . W. J. CAMPBELL, 61 Fountainhall Road, Edinburgh.
Inverness . IAN M. CAMPBELL, Bal Blair, Invershin, Sutherland.

JAMES R. LUMSDEN of Arden, Dumbartonshire, Chairman of Board of Directors, *ex officio*.

The EARL OF HOME, K.T., The Hirsell, Coldstream, Treasurer, *ex officio*.

ALEXANDER MURDOCH, East Hallside, Cambuslang, Honorary Secretary, *ex officio*.

REPRESENTATIVES ON OTHER BODIES.

National Agricultural Examination Board and National Dairy Examination Board.

Major R. F. BREBNER, C.B.E., The Leuchold, Dalmeny House, Edinburgh.
 JAMES R. LUMSDEN of Arden, Dumbartonshire.
 ALEXANDER MURDOCH, East Hallside, Cambuslang.
 JAMES PATON, Kirkness, Glencairn.
 Sir JOSHUA ROSS-TAYLOR, Mungoswalls, Duns.
 JOHN STIRTON, O.B.E., 8 Eglinton Crescent, Edinburgh.

Edinburgh and East of Scotland College of Agriculture.
 JOHN STIRTON, O.B.E., 8 Eglinton Crescent, Edinburgh.

West of Scotland Agricultural College.
 JAMES R. LUMSDEN of Arden, Dumbartonshire.

Aberdeen and North of Scotland College of Agriculture.
 JAMES DURN, Crichton, Inverurie.

Royal (Dick) Veterinary College.

Major R. F. BREBNER, C.B.E., The Leuchold, Dalmeny House, Edinburgh.

Glasgow Veterinary College.

ALEXANDER MURDOCH, East Hallside, Cambuslang.

Animal Diseases Research Association.

Major R. F. BREBNER, C.B.E., The Leuchold, Dalmeny House, Edinburgh.

Scottish Agricultural Organisation Society, Ltd.

WILLIAM ALLISON, Almond Hill, Kirkliston.

WILLIAM D. SIMPSON, Highfield, North Berwick.

Scottish Milk Records Association.

JAMES KILPATRICK, Craigie Mains, Kilmarnock.

Captain IAN S. ROBERTSON, Linkwood, Elgin.

JAMES WITHER, Awhirk, Stranraer.

National Trust for Scotland.

Sir JOSHUA ROSS-TAYLOR, Mungoswalls, Duns.

Royal Scottish Agricultural Benevolent Institution.

JAMES R. LUMSDEN of Arden, Dumbartonshire.

Association for the Preservation of Rural Scotland.

The EARL OF ELGIN AND KINCARDINE, K.T., C.M.G., Broomhall, Dunfermline.

Scottish Country Industries Development Trust.

The EARL OF ELGIN AND KINCARDINE, K.T., C.M.G., Broomhall, Dunfermline.

Scottish National Association of Young Farmers' Clubs.

JAMES PATON, Kirkness, Glencraig.

SCOTTISH PLANT REGISTRATION STATION.

Standing Committee of Management.

Major R. F. BREBNER, C.B.E., The Leuchold,
Dalmeny House, Edinburgh.
JAMES HOPE, Eastbarns, Dunbar.
JAMES WITHER, Awhirk, Stranraer.

*Appointed for
5 years from 1st
January 1941.*

MEETINGS.

General Meetings.—By the Charter the Society must hold two General Meetings each year, and, under ordinary circumstances, they are held in the months of January and June, for the election of Members and other business. Twenty a quorum.

By a resolution of the General Meeting held on 15th January 1879, a General Meeting of Members is held in the Showyard on the occasion of the Annual Show.

With reference to motions at General Meetings, Bye-Law No. 19 provides that—"At General Meetings of the Society no motion or proposal (except of mere form or courtesy) shall be submitted or entertained for immediate decision unless notice thereof has been given two weeks previously to the Board of Directors, without prejudice, however, to the competency of a motion or proposal, of which due notice has not been given, being remitted to the Directors for consideration, and thereafter being disposed of at a future General Meeting."

Directors' Meetings.—The Board of Directors meet (except when otherwise arranged) on the first Wednesday of each month from November to June, inclusive, at 1.30 p.m., and occasionally as business may require, on a requisition by three Directors to the Secretary, or on intimation by him. Seven a quorum.

Committee Meetings.—Meetings of the various Committees are held as required.

Nomination of Directors.—Meetings of Members, for the purpose of nominating Directors to represent the Show Divisions on the Board for the year 1946-1947, will be held at the places and on the days after-mentioned :—

DIVISION.	
1. <i>Edinburgh.</i>	Market Buildings, Gorgie, Edinburgh . . . Wed., 30th Jan. 1946, at 1.
2. <i>Glasgow.</i>	Central Station Hotel, Glasgow . . . Wed., 13th Feb. 1946, at 1.
3. <i>Stirling.</i>	Golden Lion Hotel, Stirling . . . Thur., 14th Feb. 1946, at 1.30.
4. <i>Perth.</i>	Station Hotel, Cupar . . . Tues., 19th Feb. 1946, at 2.30.
(The Meeting will be held in 1947 at Cupar; in 1948 at Perth.)	
5. <i>Borders.</i>	County Buildings, St Boswells . . . Thur., 21st Feb. 1946, at 3.
6. <i>Inverness.</i>	Station Hotel, Inverness . . . Tues., 20th Feb. 1946, at 2.
7. <i>Aberdeen.</i>	Imperial Hotel, Aberdeen . . . Fri., 1st March 1946, at 2.30.
8. <i>Dumfries.</i>	King's Arms Hotel, Dumfries . . . Wed., 13th March 1946, at 2.30.

The nomination of a Proprietor or other Member paying the higher subscription must be made in the 3rd, 6th, 7th and 8th Divisions; and the nomination of a Tenant-Farmer or other Member paying the lower subscription in the 1st, 2nd, 4th and 5th Divisions.

A Member who has served as an Ordinary Director for a term of four years is not eligible to be nominated again till after the lapse of at least one year. An Extraordinary Director may, however, be nominated as an Ordinary Director.

GENERAL SHOW.

Owing to the outbreak of War, the Board of Directors decided to cancel all Shows during the War.

EXAMINATIONS.

Agriculture.—In order to assist candidates at the English and Welsh Colleges, the Examination in 1945 for the National Diploma in Agriculture will be held (1) in the Chambers of the Highland and Agricultural Society of Scotland on Wednesday, 4th April, and following days. Applications close on Tuesday, 20th February; (2) at the University of Leeds on Wednesday, 11th July, and following days. Applications close on Saturday, 21st May.

Dairying.—The Examination in 1945 (Scottish Centre) for the National Diploma in Dairying will be held at the Dairy School for Scotland, Auchincruive, Ayr: *Written*—On Tuesday, Wednesday, and Thursday, 4th, 5th, and 6th September. *Oral and Practical*—On Monday, 17th September, and following days. Applications close on Tuesday, 31st July.

Forestry.—The Final Examination for the Society's First and Second-Class Certificates in Forestry was held in 1935.

In view of the institution of Examinations for Certificates and Diplomas in Forestry by the Royal Scottish Forestry Society, and by arrangement with that Society, the Board of Directors of the Highland and Agricultural Society of Scotland resolved in 1935 to cease holding further Examinations for the First and Second-Class Certificates, and that, in future, the granting of Certificates and Diplomas be left in the hands of the Royal Scottish Forestry Society.

All communications in connection with Examinations in Forestry should now be addressed to the Secretary, Royal Scottish Forestry Society, 8 Rutland Square, Edinburgh 1.

NATIONAL DIPLOMA IN AGRICULTURE

By a Supplementary Charter under the Great Seal, granted in 1856, the Society is empowered to grant Diplomas.

From 1858 to 1899 the Society held an annual Examination for Certificate and Diploma in Agriculture. In 1873 the Free Life Membership of the Society was granted to winners of the Diploma. In 1882 permission was given to holders of the Diploma to append the letters F.H.A.S. to their names. These arrangements terminated in 1899.

In 1898 it was resolved by the Royal Agricultural Society of England and the Highland and Agricultural Society of Scotland to discontinue the independent Examinations in Agriculture held by the two Societies, and to institute in their stead a Joint-Examination for a NATIONAL DIPLOMA IN AGRICULTURE (N.D.A.). This Examination is now conducted under the management of "The National Agricultural Examination Board" appointed by the two Societies. The first Joint Examination was held in 1900.

REGULATIONS FOR EXAMINATION IN THE SCIENCE AND PRACTICE OF AGRICULTURE

EXAMINATIONS IN 1945.

1. The Societies may hold conjointly, under the management of the National Agricultural Examination Board appointed by them, an Annual Examination in the Science and Practice of Agriculture, at a convenient centre.

2. Candidates who pass the Examination will receive the National Diploma in Agriculture—the Diploma to be distinguished shortly by the letters "N.D.A."

3. The Examination will be conducted by means of written papers and oral examinations.

4. In order to be eligible to sit for the Board's Examination in Agriculture, a candidate must—

(a) Present a certificate from a recognised Agricultural College that his attainments in the subjects of *General Botany, Geology, General Chemistry, Physics, and Mechanics*, as attested by class and other examinations, are, in the opinion of the authorities of the College, such as to justify his admission to the Board's Examination; or

(b) Produce evidence that he has passed the 1st B.Sc. or the Intermediate Examination in Science of a British University; or

(c) Present a School Certificate awarded by a British University Examination Board, and produce evidence that he has continued his study of science for at least a year and has obtained a certificate in Physics, Chemistry, and Botany at the Higher Certificate Examination of a British University Examination Board; or

(d) Present a Leaving Certificate in Science (including Chemistry and Botany) of the Scottish Education Department.

5. In the case of students who satisfy the Board that they have not had the facilities for obtaining the foregoing certificates, the Board will be prepared to consider evidence of equivalent attainment. [Applications under this rule must be lodged *three months* before the date of the annual examination.]

6. *Before sitting for the PRACTICAL AGRICULTURE and FARM MACHINERY AND IMPLEMENTS papers, all candidates must produce evidence of possessing a practical knowledge of Agriculture obtained by residence on a farm in the British Isles for a period or periods (not more than two) covering a complete year of farming operations.*

7. Candidates will have the option of taking the whole of the following nine papers at one time, or of sitting for a group of *any three, four, or five* in the first year and the remaining subjects (at one examination) within the next two years:—

SUBJECT.	Maximum Marks.	Pass Marks.
1. Practical Agriculture (First Paper) . . .	400	240
2. Practical Agriculture (Second Paper) . . .	400	240
3. Farm Machinery and Implements . . .	300	150
4. Land Surveying and Farm Buildings . . .	100	50
5. Agricultural Chemistry . . .	200	100
6. Agricultural Botany . . .	200	100
7. Agricultural Book-keeping . . .	200	100
8. Agricultural Zoology . . .	100	50
9. Veterinary Science and Hygiene . . .	200	100
	<hr/> 2100	<hr/> 1130

NOTE.—Candidates taking the Examination in two groups of subjects are recommended to take Agricultural Chemistry and Agricultural Botany in the first group.

8. A candidate who obtains not less than three-fourths (1575) of the aggregate maximum marks (2100) in the entire Examination will receive the Diploma with Honours, provided that he obtains not less than three-fourths (600) of the maximum marks (800) in the two Practical Agriculture papers.

9. Candidates electing to take the entire Examination at one time and failing in not more than three subjects may appear for these subjects in the following year. Failure in more than three subjects will be regarded as failure in the whole Examination.

10. In the case of candidates electing to take the Examination in two groups—

(a) A candidate appearing for a group of *three* subjects and failing in a single subject may, *in the case of a first group*, appear for that subject along with the second group, or, *in the case of a second group*, in the following year. Failure in more than one subject will be regarded as failure in the group.

(b) A candidate appearing for a group of *four* or more subjects and failing in not more than two subjects may, *in the case of a first group*, appear for these subjects along with the second group, or, *in the case of a second group*, in the following year. Failure in more than two subjects will be regarded as failure in the group.

11. Non-returnable fees must be paid by candidates as follows :—

Entire Examination	. . .	Six guineas.
Group of subjects	. . .	Three guineas.
Reappearance for any subjects	. . .	10/6 per subject.

12. The Board reserve the right to postpone, abandon, or in any way, or at any time, modify an Examination, and also to decline at any stage to admit any particular candidate to the Examination.

EXAMINATIONS IN 1945.

In order to assist candidates at the English and Welsh Colleges, the Board decided to hold two Examinations in 1945.

Candidates will be permitted to appear at EITHER of these, but not at both.

The Examinations will be held as under :—

SCOTLAND.—At Edinburgh in the Chambers of the Highland and Agricultural Society of Scotland, 8 Eglinton Crescent, on WEDNESDAY, 4th APRIL 1945, and following days. Last date for receiving Applications, TUESDAY, 20th FEBRUARY 1945.

ENGLAND.—At the University of Leeds, on WEDNESDAY, 11th JULY 1945, and following days. Last date for receiving Applications, MONDAY, 21st MAY 1945.

Forms of Application for permission to sit at either Examination may be obtained from : "The Secretary, Royal Agricultural Society of England, 16 Bedford Street, London, W.C.1." or from "The Secretary, Highland and Agricultural Society of Scotland, 8 Eglinton Crescent, Edinburgh, 12."

SYLLABUS OF SUBJECTS OF EXAMINATION.

PRACTICAL AGRICULTURE.

1.—FIRST PAPER.

1. *British Farming.*—Arable, stock-raising, dairying—Approximate areas covered by the different systems—Typical examples of each—Area in Great Britain under chief crops—Numbers of live stock—The recent history of agriculture—Short summary of agricultural returns.

2. *Climate.*—The effect of climate on farming practice—Rainfall—Temperature—Prevailing winds—Weather forecasts.

3. *Soils.*—The influence of geological formations on the systems of farming—Classification of soils—Character and composition—Suitability for cultivation. Reclamation—Drainage—Irrigation—Warping—Application of lime and marl—Bare fallows—Tillage—Subsoiling—Deep and thorough cultivation.

4. *Manures*.—The manures of the farm—The treatment of farm-yard manure—The disposal of liquid manure and sewage—General manures—Special manures—Field trials of manures—The application of manures—Period of application and amounts used per acre—Unexhausted value of manures and feeding-stuffs.

5. *Crops*.—Wheat, barley, oats, rye, beans, peas, potatoes, turnips, swedes, mangolds, sugar beet, forage plants, hops, and other crops—Their adaptation to different soils and climates—Varieties—Selection of seed—Judging seeds—Cultivation, weeds and parasitic plants, best methods of prevention and eradication—Harvesting—Storing—Cost of production—Improvement of crops by selection and hybridising—Field trials—Methods which the farmer may adopt—Selection to resist disease—The principles of rotations—Rotations suitable for different soils and climates—Rotations and the maintenance of fertility—Green manuring—Leguminous crops in rotation—Catch crops—The advantages and disadvantages of rotations—Specialised farming—Management of Orchards.

2.—SECOND PAPER.

6. *Live Stock*.—The different breeds of British live stock—Their origin, characteristics, and comparative merits—Suitability for different districts—Breeding—General principles—Selection—Mating—Crossing—Rearing and general management—Breeding and rearing of horses, cattle, sheep, pigs, and poultry. Rearing colts and raising store stock—The foods of the farm—Their composition and suitability for different classes of stock—Purchased foods—Composition and special value—Rations for different kinds and ages of stock—Cost of producing beef, mutton, pork, and milk—Cost of feeding farm horses.

7. *The disposal of Crops, Produce, and Stock*.—Marketing grain and other crops—Sale of stock—Live weight—Dead weight.

8. *Milk*.—The production and treatment of milk—The manufacture of cheese, butter, &c.—The utilisation of by-products.

9. *Farming Capital*.—Calculations of the stocking and working of arable, stock, and dairy farms—Farm valuations—Rent and taxes.

10. *Labour*.—Organisation of labour—piece-work, time-work—labour costings.

11. *Renting a Farm*.—Indications of condition, productive power, and stock-carrying capacity—Leases—Conditions of occupancy.

N.B.—It is essential that a candidate know his subject practically, and that he satisfy the Examiner of his familiarity with farm work and management.

3.—FARM MACHINERY AND IMPLEMENTS.

1. *Power*.—The principle of action, construction, method of working, also care and management of steam engines and boilers, gas, oil and petrol engines and agricultural tractors. Cost and working expenses in connection with the above. Estimation of the brake horse-power of engines. Power derived from water. Measurement of the quantity of water flowing in a stream. General arrangement of water-power plants. Water-wheels. Turbines. Pumps—

principle of action and construction. Flow of water through pipes. Hydraulic ram. Windmills.

2. *Agricultural Implements and Machinery.*—The mode of action and the general principles involved in the construction and working of farm implements and machinery. Arrangements of machinery with respect to the power plant. Pulleys and belting. Shafting and bearings. Lubrication. Lifting appliances. Strength and care of chains. Concrete and its use in the construction of simple foundations for engines and machines.

3. *Implements of Cultivation.*—Ploughs—Cultivators—Grubbers—Harrows—Drills. Manure Distributors. Seeding and planting implements.

4. *Implements of Harvesting.*—Mowing and Reaping machines—Rakes—Teddies—Elevators—Potato raisers.

5. *Implements of Transit.*—Carts, waggons, rick lifters, tractors.

6. *Threshing and Food-preparing Machinery.*—Threshing machines, stationary and portable—Screen Winnowers—Hummelers, Chaff cutters—Pulpers—Cake breakers.

7. *Dairy Appliances.*—Milking machines—Cream separators—Churns and other butter-working appliances—Milk delivery cans—Cheese-making utensils—Vats and presses.

N.B.—Candidates are expected to have had some experience with agricultural machinery and implements under actual working conditions, and to be capable of illustrating their answers, when necessary, by intelligible sketches or diagrams.

4.—LAND SURVEYING AND FARM BUILDINGS.

1. The use and adjustment of instruments employed in Surveying and Levelling other than the Theodolite.

2. Land surveying by chain, Plotting from field book, and determination of areas surveyed. The simpler "field problems."

3. Levelling and plotting from field book.

4. A knowledge of the various classes of maps published by the Ordnance Survey Department and their Scales.

5. *Roads and Fences.*—The construction and maintenance of farm roads, fences, and ditches.

6. *Land Drainage.*—Methods of draining; mole and pipe drains; cost of construction and maintenance.

7. *Buildings.*—Buildings required on different classes of farms—Economical arrangement of farm buildings—Materials—Construction—Ventilation—Drainage—Water supply—Dimensions of dairy, stables, cow-sheds, yard, courts, and piggeries—Accommodation for power—Implement, machinery, and cart sheds—Hay and grain sheds—Shelter sheds—Storage of manure.

N.B.—Each candidate should have with him at the Examination a pair of compasses, scales of equal parts, including scales of one chain to the inch, 4 feet to the inch, 8 feet to the inch, and the scale fitting the Ordnance Map, $\frac{1}{25000}$ or 25·344 inches to the mile, a small protractor, a set-square, and a straight-edge about 18 inches in length.

5.—AGRICULTURAL CHEMISTRY.

1. *The Atmosphere*.—Its composition and relations to plant and animal life.

2. *Water*.—Rain water—Soil water and drainage—Drinking water—Sewage and irrigation.

3. *The Soil*.—Origin, formation, and classification of soils—Sampling—Analysis—Composition of soils—The chemical and physical properties of soils—The water and air of the soil—Biological changes in the soil—The soil in relation to plant growth—Fertility—Causes of infertility—Improvement of soils.

4. *Manures*.—Theories of manuring—Classification of manures—Origin, nature, and characteristics of manures—Manufacture of manures—Composition, analysis, adulteration, and valuation of manures—Farmyard manure and other natural manures—Green-manuring—Liming, marling, claying—Artificial manures, their origin and manufacture—Fertilisers and Feeding Stuffs Act—Sampling of manures.

5. *Poisons, Antiseptics, and Preservatives*.—General chemical composition and character of insecticides, fungicides, antiseptics, and preservatives used on the farm.

6. *Plants and Crops*.—Constituents of plants—Assimilation and nutrition of plants—Sources of the nitrogen and other constituents of plants—Germination—Action of enzymes—Composition and manurial requirements of farm crops—Food products derived from crops—Manuring experiments.

7. *Animals*.—Composition of animal body—Animal nutrition—Digestion—Assimilation, metabolism, respiration, and excretion.

8. *Foods and Feeding*.—Constituents of foods—Origin, nature, and composition of chief feeding stuffs—Sampling, analysis, and adulteration of foods—Nutritive value and digestibility of food—Functions of chief food constituents—Energy values—Vitamins—Relation of foods to the production of work, meat, milk, and manure—Manurial residues of foods.

9. *Dairy Chemistry*.—The composition of milk, cream, butter, cheese, &c.—Conditions which influence the composition of milk and milk products—Action of ferments and enzymes on milk and milk products—Milk-testing—Analysis and adulteration of dairy products.

N.B.—*Candidates who are in possession of Laboratory Notes are required to bring them to the Oral Examination in this subject.*

6.—AGRICULTURAL BOTANY.

In addition to a *general knowledge* of the morphology, histology, and physiology of plants, candidates will be expected to possess a *detailed knowledge* of the following subjects:—

The classification of plants of importance in agriculture as shown by a detailed study of the genera, species, and botanical varieties of the British Crop Plants and Weeds included in the following families:—

Ranunculaceæ.	Umbelliferae.	Chenopodiaceæ.
Cruciferae.	Compositæ.	Polygonaceæ.
Caryophyllaceæ.	Solanaceæ.	Liliaceæ.
Leguminosæ.	Scrophulariaceæ.	Gramineæ.
Rosaceæ.	Labiatae.	

British grasses of agricultural importance : recognition of, at any stage of growth. Habitats of important species. Constitution of the grass flora of good meadows and pastures. Composition of seed mixtures for temporary and permanent leys on various soils. The effects of artificial manures on the flora of grass land.

The weeds of arable and grass land. Poisonous and parasitic weeds. Methods of distribution by seed and vegetatively : of eradication. Weeds as soil indicators. Recognition of the seeds of the common weeds, particularly those characteristically found in clover, grass, &c., seed.

The chief varieties of wheat, barley, oats, clovers, roots, and other farm crops ; their suitability for various climatic and soil conditions. The identification of the more important types of cereals by means of their grain characters. Characteristics of good and bad samples of cereals.

Identification of materials used in feeding cakes and meals.

Plant-breeding. Principles of heredity in plants. Pure lines. Fluctuating variability. Selection.

Disease in plants. Diseases due to the effects of parasitic fungi. Resistance to disease : conditions affecting. Fungoid diseases scheduled from time to time by the Ministry of Agriculture and Fisheries.

Yeasts and fermentation.

The general outlines of bacteriology : nitrogen fixation, nitrification, and denitrification. Putrefaction and the bacteriology of milk, butter, and cheese.

N.B.—Candidates who are in possession of Laboratory Notes are required to bring them to the Oral Examination in this subject.

7.—AGRICULTURAL BOOK-KEEPING.

1. Advantages of book-keeping to the farmer. Difficulties and how they can be overcome. Objects of book-keeping.

2. General principles of book-keeping. Double-entry system. Description and use of various books. Ledger, journal, cash-book, petty cash-book, day-books, &c. Entering transactions ; posting ; trial balance ; closing the accounts. Single-entry system.

3. Special ledger accounts : Interest, depreciation, rent and rates, improvements, private and household expenses, profit and loss and capital ; partnership accounts.

4. Bank business. Opening a bank account. Use of cheques. Deposits and overdrafts.

5. General office work ; correspondence, order notes, invoices, rendering accounts, receipts, &c. Filing systems.

6. Farm valuations for book-keeping purposes. Dates for stock-taking and principles of valuation. The farm balance-sheet.

7. Systems of farm book-keeping. Conditions that determine the most suitable system. Advantages and drawbacks of each system.

8. Accounts for the owner-occupier. Treatment of rent. Incidence of rates and tithe in England and Scotland, and their treatment as between farm and estate accounts. Improvements and upkeep and the general principles relating to maintenance claims.

9. Cost accounting. General principles and methods. Advantages, objects, difficulties.

10. Interpretation of results from ordinary and from cost accounts. Precautions necessary. Use of accounts as a guide to efficient management.

11. Income Tax. How the farmer is assessed. Preparation of Income Tax return. Treatment of Income Tax in accounts.

8.—AGRICULTURAL ZOOLOGY.

The Examination is designed to test practical knowledge, and therefore Candidates will be expected to recognise the animals of agricultural importance referred to in the Syllabus.

GENERAL.

A general knowledge of the characteristics of living animals and how they differ from plants.

One-celled animals, *e.g.*, Amœba, and many-celled animals.

General outline of the classification of animals and the characters on which it is based.

Organic Evolution. Theories of Heredity.

SPECIAL.

I. *Invertebrates*.—A. The Worm Parasites of Stock. Flat and Round Worms. Structure and Life History, for example, of Liver-fluke, Tapeworm, Ascaris. The mode of life and life history of the chief worm enemies of the domesticated animals. Preventive and remedial measures.

B. The Arachnid enemies of Stock: Mange or Scab Mites, Demodex Mites, Ticks. External structure and life history. Control measures.

C. The Insect enemies of Stock: (a) External parasites, *e.g.*, gadflies, warble flies, blue-bottles, green-bottles, stable fly, ked, lice; (b) Internal parasites, *e.g.*, bot and warble flies.

D. Insects injurious to Crops: Structure and classification of insects. Mode of life and life history of the chief insect pests of agricultural crops.* Control, preventive and remedial measures—natural control; artificial control (Insecticides).

* The chief pests are detailed in Pamphlets issued by the Ministry of Agriculture and Fisheries.

E. Other invertebrates of agricultural importance, *e.g.*, earth-worms, eelworms, slugs and snails, centipedes and millepedes, gall mites.

II. *Vertebrates*.—Birds: the commoner birds of farm importance, their recognition and an estimate of their work.

Mammals: Outstanding characters for recognition, and the economic importance of:—

1. Ungulata or Hoofed Mammals, *e.g.*, horse, pig, cattle, sheep, deer.
2. Rodentia or Gnawing Mammals, *e.g.*, hares, rabbits, rats, mice, voles, squirrels.
3. Insectivora, *e.g.*, mole, hedgehog, shrew.
4. Carnivora, *e.g.*, dog, fox, polecat, stoat, weasel, badger.

N.B.—Candidates who are in possession of Laboratory Notes are required to bring them to the Oral Examination in this subject.

9.—VETERINARY SCIENCE AND HYGIENE.

1. Elementary anatomy and physiology of the horse, ox, sheep, and pig, and their relation to unsoundness and disease.
2. The general principles of breeding—including the physiology of reproduction, the laws of heredity, the periods of gestation, and the signs of pregnancy in the mare, cow, ewe, and sow.
3. Dentition as a means of determining the age of horses, cattle, sheep, and swine.
4. The management of farm stock in health and disease.

N.B.—Candidates who are in possession of Laboratory Notes are required to bring them to the Oral Examination in this subject.

WINNERS OF DIPLOMA IN 1944.

EDINBURGH EXAMINATION.

Diploma.

- EDWIN ASCOUGH, University of Leeds.
 ARTHUR ASHER, Midland Agricultural College.
 GEORGE ERIC BAINES, Midland Agricultural College.
 BARRIE JAMES BARNFATHER, University of Leeds.
 MARCUS SAUL BROOKE, University of Glasgow and West of Scotland Agricultural College.
 PETER JULIAN BROUGHTON-HEAD, West of Scotland Agricultural College.
 ANDREW M'GOWN CAMERON, West of Scotland Agricultural College.
 EDWIN FIRBANK COLLINGWOOD, King's College, Newcastle-on-Tyne.
 DENIS STEPHENSON DEWHIRST, University of Leeds.
 HECTOR FRASER, West of Scotland Agricultural College.
 ALEXANDER WILLIAM FULLARTON, Edinburgh and East of Scotland College of Agriculture.
 JAMES NORMAN HALCROW, University of Edinburgh.
 ALEXANDER EASTON MONTGOMERY HOOP, University of Glasgow and West of Scotland Agricultural College.
 THOMAS DUNCAN M'CLIMONT, West of Scotland Agricultural College.
 WILLIAM MACFARLANE, West of Scotland Agricultural College.
 ALEXANDER MERRILEES MACKENZIE, University of Glasgow and West of Scotland Agricultural College.
 MARGARET BAIN MILLAR, West of Scotland Agricultural College.
 JOHN WILSON MUIR, University of Glasgow and West of Scotland Agricultural College.
 DAVID BAYES PERRY, Harper Adams Agricultural College.
 JOAN MARGARET PHILLIPS, Midland Agricultural College.
 WILLIAM WINSTON RICHARDSON, Harper Adams Agricultural College.
 COLIN THACKRAH, University of Leeds.
 NEVILLE ARLAND USSHER, Cambridge University.

LEEDS EXAMINATION.

Diploma with Honours.

DONALD MIDGLEY WALKER, University of Reading.

Diploma.

MAVIS JOAN BALDOCK, University of Reading.
 THOMAS HENRY BARTON, Midland Agricultural College.
 GEORGE WALLACE ELLIOT BENTLEY, Midland Agricultural College.
 CLARA ELLEN BOOTH, West of Scotland Agricultural College.
 RICHARD BROUGHTON, Harper Adams Agricultural College.
 MICHAEL BRIAN PICOVER CARPENTER, Midland Agricultural College.
 MICHAEL HAYDN CHESTER, Midland Agricultural College.
 ERIC GEORGE CLIFTON, Midland Agricultural College.
 ARTHUR DAVID COLESHAW, Midland Agricultural College.
 PETER STRICKLAND COOPER, Harper Adams Agricultural College.
 MARTIN EVERINGHAM COX, Midland Agricultural College.
 FRANCIS MITCHELL DARBY, Midland Agricultural College.
 IAN FERGUS DAVENPORT, Midland Agricultural College.
 JOHN STANLEY DENTON, Harper Adams Agricultural College.
 PETER DICK, Harper Adams Agricultural College.
 DOREEN FRASER, University of Reading.
 CHRISTOPHER JAMES FROGGATT, Harper Adams Agricultural College.
 PHILIP GARDINER-SWANN, Seale Hayne Agricultural College.
 MICHAEL HARRY GREENSMITH, Midland Agricultural College.
 DAVID LONDON HARBER, Harper Adams Agricultural College.
 WILLIAM ROBERT HEATHCOTE, King's College, Newcastle-on-Tyne.
 ROLAND WALTER HELME, King's College, Newcastle-on-Tyne.
 AUDREY MARIAN HINCHLIFFE, Midland Agricultural College.
 PETER YEOMANS HOBSON, Midland Agricultural College.
 ROBERT ALFRED JONES, Harper Adams Agricultural College.
 PETER DAVEY KEMP, Midland Agricultural College.
 GEOFFREY RICHARD LORING, University of Reading.
 NORMAN JOHN LYONS, Midland Agricultural College.
 MELVIN M'CORMACK, Edinburgh and East of Scotland College of Agriculture.
 WILLIAM MEAKIN, Seale Hayne Agricultural College.
 PETER LISTER MORGAN, Harper Adams Agricultural College.
 JOHN EDWARD MYATT, University of Reading.
 PHILIP FRANK PARKER, Midland Agricultural College.
 EDWARD JOHN PLUMB, Midland Agricultural College.
 JEFFREY PREST, Midland Agricultural College.
 WILLIAM RANKIN, West of Scotland Agricultural College.
 SIMON EDWARD STUART ROBINSON, Midland Agricultural College.
 JOHN ALEXANDER SAUNDERS, Seale Hayne Agricultural College.
 JOAN ERNESTINE SHEPARD, Harper Adams Agricultural College.
 RICHARD SYDENHAM SMITH, Midland Agricultural College.
 THOMAS DEACON SMITH, University of Edinburgh and Edinburgh and East of Scotland College of Agriculture.
 JOHN SPENCER, Harper Adams Agricultural College.

ANTHONY ALEXANDER TALBOTT, Harper Adams Agricultural College.
ROY JAMES TYRIE, University of Reading.
SYDNEY DAVID VIRTUE, Harper Adams Agricultural College.
DAVID WESTOBY, Midland Agricultural College.
WILLIAM PETER WHEATCROFT, Harper Adams Agricultural College.
ASETON WALLACE WHITE, University of Leeds.
JOHN FREDERICK WOODHOUSE, University of Leeds.
ANNABELLA MAIR WYLLIE, University of Glasgow and West of
Scotland Agricultural College.

EXAMINATION PAPERS OF PAST YEARS.

Copies of papers set at past Examinations in AGRICULTURE, so far as available, may be had on application. Price 1/- per set.

Sets of N.D.A. Papers available are those for the years 1944 (April), 1944 (July), 1945 (April), 1945 (July).

NATIONAL DIPLOMA IN DAIRYING

This Examination, instituted in 1897, is conducted by "The National Dairy Examination Board," appointed jointly by the Royal Agricultural Society of England, the Highland and Agricultural Society of Scotland, and the British Dairy Farmers' Association.

REGULATIONS FOR EXAMINATION IN THE SCIENCE AND PRACTICE OF DAIRYING

EXAMINATION IN 1945.

1. The Societies may hold annually in England and Scotland, under the management of the National Dairy Examination Board appointed by them, one or more examinations for the National Diploma in the Science and Practice of Dairying, on dates and at places from time to time appointed and duly announced; the Diploma to be distinguished shortly by the letters 'N.D.D.'

2. Forms of entry for the Examination in England may be obtained from "The Secretary, Royal Agricultural Society of England, 16 Bedford Square, London, W.C.1." and must be returned to him duly filled up, with the entry fee, on or before 20th July 1945.

3. Forms of entry for the Examination in Scotland may be obtained from "The Secretary, Highland and Agricultural Society of Scotland, 8 Eglinton Crescent, Edinburgh 12," and must be returned to him duly filled up, with the entry fee, on or before 31st July 1945.

4. Any candidate may enter for the Examination either in England or Scotland, but not in both, and a candidate who has once taken part in an Examination in England cannot enter for an Examination in Scotland, or *vice versa*. *An exception may be made in favour of a candidate reappearing under Regulation 10 (3) provided special application is made at the time of entry.*

5. As a preliminary to the acceptance of any application for permission to enter for the Examination, a candidate must produce:—

(1) from the Head of an approved Dairy Training College or Institute:

(a) a statement that he or she is in possession of the General School Certificate (England), the Day School Certificate Higher (Scotland), or the School Certificate of the Central Welsh Board; or a statement that his or her general education is of an equivalent standard;

- (b) a certificate testifying that he or she has satisfactorily completed courses in (i) soils, crops, rotations, cultivations, manuring of crops (other than pastures), and plant physiology; (ii) elementary chemistry, physics and mechanics, *and*
 - (c) that he or she has also attended a Diploma or Degree course in the subjects of the Examination covering at least two academic years at an approved Dairy Training College or Institute, and has satisfied the authorities of the College or Institute of his or her fitness for admission to the Examination. *This period shall include six months' instruction (consisting of not more than two periods) in practical dairy work.*
 - (d) a certificate of proficiency in soft cheese-making.
- (2) a certificate of proficiency in the milking of cows, signed by a dairy farmer, and evidence that he or she has spent at least six months in not more than two periods on an approved dairy farm and taken part in the work, both in the dairy and on the land. *This period must not run concurrently with the six months' practical training referred to in sub-section 1 (c).*
A Dairy Farm to be approved must have not fewer than fifteen cows in milk.

6. A candidate who has already taken a Degree in Agriculture of a British University, or a Diploma in Agriculture recognised by the National Dairy Examination Board, will be allowed to enter for the National Diploma in Dairying Examination after one year's subsequent training at an approved Dairy Training College or Institute, providing that such course includes at least six months' training in practical dairy work, and that he or she has spent at least six months on an approved dairy farm, and taken part in the work both in the dairy and on the land.

7. In the Examination a candidate will be required to satisfy the Examiners by means of written papers, practical work, and *viva voce*, that he or she has :—

- (1) A general knowledge of the management of a dairy farm, including the rearing and feeding of dairy stock, the candidate being required to satisfy the Examiners that he or she has had a thorough training and practical experience in all the details of dairy work as pursued on a farm.
- (2) A thorough acquaintance with the practical details of the management of a dairy, and the manufacture of butter and cheese, together with a working knowledge of the scientific principles involved in these operations.
- (3) A general knowledge of dairy book-keeping.
- (4) Practical skill in dairying, to be tested by the making of butter and cheese.

NOTE.—A candidate must be prepared to make any one of three varieties of Hard Pressed Cheese, two of which must be Cheddar and Cheshire, these three to be specified on his application form, the Examiner in Cheese-making having the option of saying, during the Examination, which a candidate shall make.

8. Candidates will have the option of :—

- (a) Taking the whole Examination at one time ; or
- (b) Taking the Examination in two parts.

A candidate taking the Examination in two parts must take the following subjects at the first sitting: DAIRY HUSBANDRY, MILK AND MILK PLANT, CREAM AND BUTTER, CHEESE AND CHEESE PRODUCTS, PRACTICAL CHEESE-MAKING AND BUTTER-MAKING; the remaining three Papers, DAIRY CHEMISTRY, DAIRY MICROBIOLOGY, and DAIRY BOOK-KEEPING, at the Examination in the following year.

9. The maximum marks obtainable and the marks required for a pass in each subject are :—

WRITTEN AND ORAL EXAMINATION—		Max.	Pass.
Dairy Husbandry	(3 hours' paper)	150	90
Milk and Milk Plant	(2 hours' paper)	100	60
Cream and Butter	" "	100	60
Cheese and Cheese Products	" "	100	60
Dairy Chemistry	" "	100	60
Dairy Microbiology	" "	100	60
Dairy Book-keeping	(3 hours' paper)	100	50
PRACTICAL EXAMINATION—CHEESE-MAKING—			
(a) One of the three Hard Pressed Cheeses specified by the candidate on his form of application		200	150
(b) Blue-veined		100	75
BUTTER-MAKING		200	150
		1250	815

Honours will be awarded to candidates obtaining an aggregate of 80 per cent (1000) of the maximum marks (1250) in the Examination, provided that they also obtain at least 80 per cent (360) of the maximum marks (450) in the Dairy Husbandry, Milk and Milk Plant, Cream and Butter, and Cheese and Cheese Products papers.

10. A candidate taking the whole Examination at one time :—

- (1) who fails in any part of the practical examination shall fail in the whole examination.
- (2) who fails in four or more subjects of the written examination shall fail in the whole examination.
- (3) who, having passed in the practical examination, fails in not more than three subjects of the written examination may, at the discretion of the Board, appear for those subjects in the following year.

11. A candidate taking the Examination in two parts, and failing in a single subject in the first part of the Examination, may, at the discretion of the Board, appear for that subject along with the second part; or, in the case of a single subject of the second part, in the following year.

Failure in more than one subject will be regarded as failure in that part of the Examination. Failure in any part of the Practical Examination will entail complete failure.

12. In all cases of failure, either in the whole Examination or in part thereof, the Board will require evidence of further study before a candidate is again admitted to the Examination.

13. The entrance fees will be as follows :—

For the whole Examination taken at one time	£3	3	0
For the Examination taken in two parts :			
First part		3	3
Second part		1	1
For reappearance, 10s. 6d. each subject.			

14. The Board reserve the right to postpone, to abandon, and to modify an Examination, and also to decline to admit any particular candidate to the Examination.

DATES OF EXAMINATIONS.

SCOTLAND.—At the Dairy School for Scotland, Auchincruive, Ayr.
WRITTEN—TUESDAY, WEDNESDAY, and THURSDAY, 4th, 5th, and 6th SEPTEMBER 1945. **ORAL AND PRACTICAL**—MONDAY, 17th SEPTEMBER 1945, and following days. Last date for receiving Applications, MONDAY, 30th JULY 1945.

ENGLAND.—At the University and British Dairy Institute, Reading, TUESDAY, 4th SEPTEMBER 1945, and following days. Last date for receiving Applications, FRIDAY, 20th JULY 1945.

SYLLABUS OF SUBJECTS OF EXAMINATION

I.—DAIRY HUSBANDRY.

Buildings of the dairy farm ; structural features, sanitation, and water supply.

Selection, stocking, and equipment of typical dairy farms ; organisation of the dairy farm.

The utilisation of the crops of the dairy farm.

Pastures and pasture management ; dried grass, silage.

Foods used on the dairy farm ; characteristics and relative value.

Live stock of the dairy farm ; essential conformation features of the dairy cow and dairy bull ; British dairy breeds ; milk recording.

Breeding of dairy stock, principles and practice ; selection, care, and management of the sire ; calf rearing ; raising of dairy heifers.

Management of dairy herds ; self-contained herds ; attested herds.

Feeding of dairy cows for milk production ; feeding standards ; construction and use of rations.

Common ailments and diseases of dairy stock : milk fever, bloat, cow pox, mastitis, contagious abortion, tuberculosis, Johne's disease, sterility, scour, hoose, notifiable animal diseases.

Hygienic milk production ; hand and machine milking ; cleaning and care of milking machines and utensils used in milk production ; milk coolers and farm sterilising equipment.

Pigs on the dairy farm ; suitable breeds for bacon and for pork production ; housing accommodation ; breeding, feeding, and management of pigs ; fattening of pigs ; pig recording ; common ailments and diseases of pigs.

II.—MILK AND MILK PLANT.

Utilisation of milk and milk products in Great Britain ; sources of supply ; the principles of organised marketing. Milk contracts.

Properties of milk.

Variations in the composition of milk ; legal minimum standards for milk ; statutory rules and orders relating to milk and milk products.

Sources of taints and contamination in milk. Abnormal milk. Flavour in milk and the contributing factors.

Grades of milk.

Food value of milk. Hard and soft curd milk.

Transportation of milk ; milk churns ; road and rail tanks ; processing of milk at milk depots ; sampling and testing of milk ; effects of heat on milk ; essentials for efficient pasteurisation ; progressive stages in milk treatment at milk plants ; weighing ; filtering ; clarifying, pumping, pasteurising, cooling, bottling, and capping ; refrigeration ; cold storage.

Disposal of wastes from milk plants.

Distribution of milk.

Special treatment of milk ; homogenisation, irradiation, stassanisation, commercial sterilisation, high temperature, short time heat treatment.

Fermented milk preparations, Yoghurt, Kefir, and cultured butter milk.

Elementary principles of condensing and drying of milk.

III.—CREAM AND BUTTER.

Cream.—Production and consumption of cream in Great Britain. Utilisation of cream ; grades of cream, regulations for the sale of cream ; different methods of obtaining cream from milk.

Operation and management of cream separators, hand and power.

Efficiency of separation ; cleaning and sterilisation of separators.

Testing of cream.

Factors influencing the flavour, physical properties, and keeping qualities of cream ; homogenisation of cream.

Pasteurisation of cream ; cooling and storage ; marketing of cream.

Cream preparations ; whipped cream, clotted cream, sterilised cream, reconstituted cream.

Cream appliances, homogenisers, cream sterilising plant, pasteurisers, cream coolers.

Ice Cream.—Types of plant used. Materials used in, and preparation of mixes. Pasteurising, ripening, freezing, and hardening.

Butter.—Production and consumption of butter in Great Britain ; sources of imports.

Food value of butter ; regulations governing the production and sale of butter.

Selection and grading of cream for butter-making.

Treatment of cream prior to churning ; heating, cooling ; preparation and use of starters.

Churning of cream ; factors affecting churning and loss of butter fat.

Washing of butter ; purity of wash water.

Methods of working and salting of butter ; quality of salt.

Packing of butter and treatment of liners and butter boxes ; storage of butter ; refrigeration in factories and in transport.

Grading and judging butter. National Mark butter. Common defects in butter and their causes.

Special systems of butter-making ; sweet cream butter ; whole milk butter ; neutralised cream butter ; whey butter.

Utilisation of by-products of butter-making ; separated milk and butter milk. Casein.

Butter-making equipment ; separators ; pasteurising plant, cream coolers, cream pumps, starter-preparing apparatus, cream ripeners, churns and butter workers. Butter packers, moulders and blenders, butter cutting, and wrapping machines.

IV.—CHEESE AND CHEESE PRODUCTS.

Production and consumption of cheese in Great Britain ; sources of imports.

Food values of cheese.

Principles of cheese-making ; varieties of cheese.

Hard-pressed cheese. Agents used in manufacturing process ; starter, colour, rennet, salt.

Milk for cheese making ; care and management.

Detailed knowledge of the manufacture of Cheddar and Cheshire, and one of the following : Derby, Dunlop, Leicester, Gloucester, or Lancashire.

Manufacture of cheese from pasteurised milk.

Small hard-pressed cheeses : Caerphilly, Smallholder, &c.

Difficulties experienced in the manufacturing process ; causes of fast and slow working, gas formation, ropy and slimy whey.

Ripening and storage of cheese.

Grading and judging of cheese ; National Mark standards.

Marketing of cheese.

Defects in the flavour, body, and texture, and in the colour of mature cheese.

Manufacture of Stilton and Wensleydale cheeses, blue-veined and white.

Soft cheese-making.

Cream cheeses. Single and double cream cheeses.

Cheese products. Manufacture of processed cheese, and cheese spreads.

Usual cheese factory equipment and arrangement ; cheese vats,

curd knives, curd agitator, cheese press, curd mill; cheese hoops, cheese turners, paraffining apparatus, pasteurising equipment, air conditioning plant.

Utilisation of whey.

V.—DAIRY CHEMISTRY.

The principal constituents of foodstuffs and the functions they fulfil. Assimilation and digestion. Vitamins.

The nature and composition of milk, colostrum, butter, cheese, cream, separated milk, butter milk, whey, casein, and lactose.

Drying and condensation of milk and milk products.

Variation in composition of milk.

Milk souring, rennet coagulation, preparation and ripening of cheese, storage of butter, salt for dairy purposes.

Metals and their influence on milk and milk products. Taints.

Effects of heat on milk. Abnormal milk.

The sampling and analysis of milk and milk products. Freezing point test for milk.

Commercial routine analysis of foodstuffs.

Chemical aspects of water supply.

Dairy detergents and disinfectants.

N.B.—Candidates are required to bring to the Oral Examination in this subject their Laboratory notebooks certified by their teachers as being the record of their Laboratory work carried out during the course.

VI.—DAIRY MICROBIOLOGY.

GENERAL.—The bacteria, yeasts, and moulds which commonly occur in milk and dairy products; their form, classification (in the case of the bacteria—Topley and Wilson's), growth, and reproduction. Factors which control rate of growth. Fermentations of importance in dairying; causal micro-organisms and conditions which influence activity.

MILK.—Microbiology of milk production; sources of contamination, their relative importance and organisms derived from them. Normal changes produced by micro-organisms in milk. Abnormal changes; ropiness, premature curdling, gas formation, bitter, yeasty and malty flavours and flavour of roots and feeding-stuffs; causal organisms and methods of prevention. Effects of straining, centrifuging, cooling, heating, condensing, drying, and preservatives on the microflora of milk. Bacteriology of pasteurised and sterilised milk; influence of quality of raw milk. Standards for graded milks.

MILK PRODUCTS.—Starters; their propagation and management. Ripening of cream; development of normal flavour. Microbiology of butter. Ripening of hard, soft, and blue-veined cheese; factors concerned and their control. Microbiology of condensed, dried, and fermented milks. Defects of dairy products, causal organisms and

preventive measures; butter defects—rancidity, yeasty and cheesy flavours, coloured spots; cheese defects—gas formation, bitterness, slow acid development and excessive acidity, colour changes; defects of condensed milk—gas formation, “buttons,” coagulation.

DISEASES.—Diseases which may be conveyed by milk; sources of infection. Bacteriology of tuberculosis, contagious abortion, mastitis, and methods of detection. Immunity; vaccines. Disinfection.

WATER.—The importance of a pure water supply for the dairy and the herd. Bacteria commonly present in natural waters. Sources of contamination, the effect of pollution with sewage, water-borne disease.

LABORATORY WORK.—The microscope and its use. Staining (including Gram and Ziehl-Neelsen methods) and microscopic examination of micro-organisms. Methods of isolation and cultivation. Preparation of bile-salt broth, milk, milk agar, and Wilson's agar. Methods for the examination of milk; plate method, post-pasteurisation count, coliform test, Breed's method and the methylene blue reduction, fermentation, acidity and catalase tests. Methods for tracing sources of contamination and of milk faults. Detection of thermophilic, thermoduric, and pathogenic organisms in milk. Examination of water supplies.

N.B.—Candidates are required to bring to the Oral Examination in this subject their Laboratory notebooks certified by their teachers as being the record of their Laboratory work carried out during the course.

VII.—DAIRY BOOK-KEEPING.

The interpretation of farm and dairy farm accounts and their use in farm and dairy management.

General principles of double-entry book-keeping. Use of day-book, journal, ledger, cash-book, and petty-cash book. Preparation of profit and loss account, capital account, and balance-sheet. Adjustments necessary for the owner-occupier.

Analysis cash-book.

Valuations.—Bases of valuations for accounting purposes on the farm and in the dairy factory. Dates for stock-taking. Stock books and quantitative records.

Methods of accounting suitable for dairy farms with varying systems of milk disposal.

Opening and operating a bank account. Cheques, deposits, and overdrafts.

General principles of the assessment of the farmer to income tax.

WINNERS OF DIPLOMA IN 1944.

SCOTTISH CENTRE.

(All the candidates at the Scottish Centre had been students at the Dairy School for Scotland, Auchincruive, Ayr.)

Diploma.

- MARGARET JOHNSTON AITKEN, Thorterlea, Hawick, Roxburghshire.
 MARY HENDRY BREWSTER, 107 Maxwell Drive, Pollokshields, Glasgow, S.1.
 MARCUS SAUL BROOKE, 303 Maxwell Road, Pollokshields, Glasgow, S.1.
 EDITH CHRISTIE, Mains of Tulloch, Keig, Aberdeenshire.
 MARY DANIEL CLARK, Rougheraig, Lennoxton, Stirlingshire.
 JOHN RUSSELL COWPER, Brunstock Cottage, Brunstock, near Carlisle.
 WINSOME DONALDSON, Dalswinton, Mansewood Road, Glasgow, S.3.
 ALAN GRAHAM, "Clifton," 13 St Quivox Road, Prestwick, Ayrshire.
 MARY KEDDIE, 7 Grierson Square, Edinburgh 5.
 CONSTANCE MARY LAING, 40 Archerhill Road, Knightswood, Glasgow, W.
 ANNE M'INNES LAMONT, 23 Baliol Street, Charing Cross, Glasgow, C.3.
 MARGARET HAZELL M'ARTHUR, 11 Craiglea Place, Edinburgh 10.
 HELEN CHRISTINE M'IVER, 12 Dick Place, Edinburgh 2.
 DOUGLAS WILLIAM MAROCHAM, Low Moor End, Hutton Roof, Kirkby Lonsdale, Westmorland.
 FLORENCE MARTINET, 4 Merchiston Bank Avenue, Edinburgh 10.
 JOHN WILSON MUIR, Castleview, Shieldhill, by Falkirk.
 ROBERT ERNEST PAGET, Thrummyriggs, Beattock, Dumfriesshire.
 JAMESINA HELEN PETER, North Lodge, Tyrie, Fraserburgh, Aberdeen-shire.
 DOROTHY ESTELLE PRICE, 1 Rosslyn Terrace, Helensburgh, Dum-bartonshire.
 MARGARET AILWEN BROWN ROGER, Pepperknowes Farm, Glencarse, Perthshire.
 DOREEN ISOBEL SMITH, Post Office House, Lauder, Berwickshire.
 MARY ANN TULLOCH, "Kirbest," North Ronaldsay, Orkney Isles.
 WINIFRED MURRAY TURNER, 21 Denholm Terrace, Greenock.
 HELEN FRAME WHITELAW, The Schoolhouse, Motherwell Street, Airdrie.
 ALEXANDER C. WILKIE, The Cottage, Skellyton Farm, Larkhall, Lanarkshire.
 MARGARET AGNES WILSON, Barnaigh, Alva, Clackmannanshire.

ENGLISH CENTRE.

Diploma.

- JOHN DAVID BONNAUD, University College of Wales, Aberystwyth.
ANNE BURBOWS, Midland Agricultural College, Sutton Bonington.
CLAUDETTE ROSANNE CALDICOTT, The University and British Dairy Institute, Reading.
ROMA JOYCE CASTLE, Midland Agricultural College, Sutton Bonington.
RICHARD ALAN CHAPMAN, Midland Agricultural College, Sutton Bonington.
ELSIE MARY COOMBS, The University and British Dairy Institute, Reading.
EDITH BERYL CURNOCK, The University and British Dairy Institute, Reading.
ELIZABETH JOAN DINSDALE, The University and British Dairy Institute, Reading.
JENNY DUNDAS, Studley College, Warwickshire.
SARAH BOWEN EDMUNDS, University College of Wales, Aberystwyth.
BETTY WINIFRED ENSOR, Studley College, Warwickshire.
ROSEMARY DURLEY GRAZEBROOK, The University and British Dairy Institute, Reading.
ELSIE MARION GREENSLADE, Seale Hayne Agricultural College, Newton Abbot.
ELIZABETH GRINSTED, The University and British Dairy Institute, Reading.
LUCILLE MAY GRUNDY, University College of Wales, Aberystwyth.
MARGARET HUDSON, Midland Agricultural College, Sutton Bonington.
MARY ELUNED JONES, University College of Wales, Aberystwyth.
MARCELLA SHEILA KAY, The University and British Dairy Institute, Reading.
ELIZABETH ALMA LEWIS, University College of Wales, Aberystwyth.
ANTHONY JAMES QUICK, Midland Agricultural College, Sutton Bonington.
VALERIE ESTELLE RICHARDS, University College of Wales, Aberystwyth.
JEANNETTE AUDREY RIPPON, The University and British Dairy Institute, Reading.
ELIZABETH JILL RIVETT, The University and British Dairy Institute, Reading.
JUNE MARY ROBERTS, Studley College, Warwickshire.
JUNE ELLEN ROFF, Studley College, Warwickshire.
MORAG MACKINLAY SHIELD, The University and British Dairy Institute, Reading.
PHYLLIS KATHLEEN BERYL SMITH, University College of Wales, Aberystwyth.
MABEL SUMNER, The University and British Dairy Institute, Reading.
NORMAN TASKER, Midland Agricultural College, Sutton Bonington.
DAPHNE MARY WARREN, The University and British Dairy Institute, Reading.
MARGARET WERNHAM, Midland Agricultural College, Sutton Bonington.

DORINE ROSE WIDDAS, Studley College, Warwickshire.

BARBARA WILLEY, Midland Agricultural College, Sutton Bonington.

KENNETH F. WILLIAMSON, Midland Agricultural College, Sutton Bonington.

KATHLEEN WILSON, The University and British Dairy Institute, Reading.

MARGARET JEAN WITHERS, The University and British Dairy Institute, Reading.

EXAMINATION PAPERS OF PAST YEARS.

Copies of papers set at past Examinations in DAIRYING may be had on application. Price 1/- per set. Papers available are those for the years 1939-1945 inclusive.

CERTIFICATES IN FORESTRY

In 1870 the Society instituted an Examination in Forestry, and granted First and Second-Class Certificates respectively to such students as attained a certain standard of proficiency in the following subjects. Candidates were required to possess a thorough acquaintance with the theory and practice of Forestry, and a general knowledge of the following branches of study, so far as these applied to Forestry: (a) the elements of Forest Botany and Forest Zoology; (b) the elements of Meteorology and Geology; (c) Forest Engineering; and (d) Arithmetic and Book-keeping.

Holders of the First-Class Certificate were entitled to become free Life Members of the Society.

In view of the institution of Examinations for Certificates and Diplomas in Forestry by the Royal Scottish Forestry Society, and by arrangement with that Society, the Board of Directors of the Highland and Agricultural Society of Scotland resolved in 1935 to cease holding further Examinations for the First and Second-Class Certificates, and that, in future, the granting of Certificates and Diplomas be left in the hands of the Royal Scottish Forestry Society.

The list of students who obtained the Highland and Agricultural Society's Certificates in Forestry prior to 1899 appears in the 'Transactions' for the year 1899. A further list of those obtaining Certificates between 1899 and 1935 inclusive appears in the 'Transactions' for the year 1935. The total number of Certificates granted since the commencement of the Examination in 1870 was as follows: First-Class, 43; Second-Class, 38.

VETERINARY CERTIFICATES AND MEDALS

The Society established a Veterinary Department in 1823, but by an arrangement made with the Royal College of Veterinary Surgeons, the Society's examination ceased in 1881. Holders of the Society's Veterinary Certificate are entitled to become members of the Royal College of Veterinary Surgeons on payment of certain fees, without being required to undergo any further examination. The number of students who passed for the Society's Certificate is 1183.

The Society gives annually a limited number of silver medals for Class competition to each of the two Veterinary Colleges in Scotland—the Royal (Dick) Veterinary College, Edinburgh, and the Glasgow Veterinary College, Glasgow.

ENTOMOLOGICAL DEPARTMENT

Consulting Zoologist to the Society—A. E. CAMERON, M.A., D.Sc.,
Department of Agricultural and Forest Zoology, University of
Edinburgh, 10 George Square, Edinburgh.

REPORTS ON THE ANIMAL ENEMIES OF CROP PLANTS AND LIVE STOCK (INCLUDING POULTRY).

The Consulting Zoologist is prepared to send to any Member of the Society a Report on damage to, or diseases of, plants and animals due to animal agency (Insects, Mites, Worms, Snails, Slugs, Birds, and the Smaller Mammals), and will advise Members regarding insects or allied animals which, in any stage of their development, infest—

- | | |
|-----------------------------------|-------------------------------------|
| (a) Farm crops. | (d) Fruit and fruit trees. |
| (b) Stored grain and foodstuffs. | (e) Forest trees and stored timber. |
| (c) Garden and greenhouse plants. | (f) Live stock (including poultry). |

Any Member consulting Dr Cameron should give him full particulars of the damage or disease upon which his advice is desired. In addition, there should be sent to him specimens of the injured plants, or the injured parts of plants, &c., as well as specimens of the insects or animals believed to be the cause of the injury.

Specimens should be sent in tin or wooden boxes, or in quills, in order to prevent injury in transmission.

The Directors have fixed the fee payable by Members to Dr Cameron at 2s. 8d. for each case upon which he is consulted: this fee should be sent to him along with the application for information.

Letters and parcels (carriage or postage paid) should be addressed to A. E. Cameron, Esq., M.A., D.Sc., Department of Agricultural and Forest Zoology, University of Edinburgh, 10 George Square, Edinburgh.

CHEMICAL DEPARTMENT

Chemist to the Society—J. F. TOOHER, D.Sc., LL.D., F.I.C.,
Crown Mansions, 41½ Union Street, Aberdeen.

The object of the Chemical Department is to promote the diffusion of a knowledge of Chemistry as applied to agriculture among the members of the Society, to carry out experiments for that purpose, to assist members who are engaged in making local experiments requiring the direction or services of a chemist, to direct members in regard to the use of manures and feeding-stuffs, to assist them to put the purchase of these substances under proper control, and in general to consider all matters coming under the Society's notice in connection with the Chemistry of Agriculture.

MEMBERS' PRIVILEGES IN RESPECT TO ANALYSES.

The Directors are anxious to take any steps in their power to expose the vendors of inferior fertilisers and feeding-stuffs, and the members can give them assistance in this by supplying to the Chemist, when sending samples for analysis, information as to the guarantee, if any, on which the goods were sold, and also as to the price charged.

These charges apply only to analyses made for agricultural purposes, and for the sole and private use of members of the Highland and Agricultural Society who are not engaged in the manufacture or sale of the substances analysed.

Valuations of manures, according to the Society's scale of units, will be supplied if requested.

The Society will not be liable for payment of fees in respect of analyses for any member in excess of £5 for any one year, or £10 for any five consecutive years.

The undernoted fees are those payable by a member. These amounts represent only one-third of the total fee for any particular analysis, the other two-thirds being paid by the Society.

This scale does not apply to members whose subscriptions are in arrears.

FERTILISERS AND FEEDING-STUFFS.

- | | |
|---|------|
| (1) The determination of one ingredient in a single sample of a <i>manure</i> or of a <i>feeding-stuff</i> | 3/6 |
| (2) The determination of two ingredients in a single sample of a <i>manure</i> or of a <i>feeding-stuff</i> | 5/- |
| (3) The complete analysis of a sample of a <i>manure</i> or of a <i>feeding-stuff</i> | 10/- |

*For example—**For one ingredient only.*

Linseed and other cakes, for oil or for albuminoids . . .	} 3/6
Feeding meals, ground cereals, for oil or for albuminoids . . .	
Bone meals, for nitrogen or for total phosphate . . .	
Compound manures, for nitrogen or for soluble phosphate or for insoluble phosphate or for potash . . .	
Superphosphate, for soluble phosphate or for insoluble phosphate . . .	
Ground mineral phosphate, for insoluble phosphate or for citric soluble phosphate . . .	
Slag phosphate, for insoluble phosphate or for citric soluble phosphate . . .	

For two ingredients only.

Any two ingredients of a manure or of a feeding-stuff . . .	5/-
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For a complete analysis.

For manures, the proportions of nitrogen (nitrogen included as nitrates or as ammonia compounds), soluble phosphate, insoluble phosphate, potash; For feeding-stuffs, the proportions of oil, albuminoids, carbohydrates, iodine, mineral matter, fibre and moisture . . .	10/-
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|---|-----|
| (4) Ground Limestone, for carbonic acid and calcium, two determinations . . . | 5/- |
| (5) Ground Lime, for percentage of calcium oxide . . . | 3/6 |

AGRICULTURAL PRODUCTS.

- | | |
|---|------|
| (6) Turnips, sugar beet, for total sugar . . . | 5/- |
| (7) Turnips, sugar beet, for oil, albuminoids, sugar, mineral matter, fibre and moisture . . . | 10/- |
| (8) Grass, hay, ensilage, grain, &c., for oil, albuminoids, carbohydrates, mineral matter, fibre and moisture . . . | 10/- |
| (9) Grain, for carbohydrates and moisture . . . | 5/- |

MILK AND MILK PRODUCTS.

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|---|-----|
| (10) Milk, fresh, for butter fat only, by Gerber process . . . | 1/- |
| (11) Milk, fresh, for butter fat, by Gerber, and solids not fat . . . | 2/6 |
| (12) Milk, sour sample, for butter fat, and solids not fat. Soxhlet extraction and Government Laboratory method for sour sample . . . | 5/- |
| (13) Milk, for preservatives, borates, sulphur dioxide, hydrogen peroxide, formalin . . . | 5/- |
| (14) Butter, for true butter fat and moisture (Reichert), for genuineness . . . | 5/- |
| (15) Butter, for true butter fat (Reichert), moisture, foreign fat, preservatives . . . | 7/6 |

WATER AND LIQUID SUBSTANCES.

Cases containing bottles for water samples and instructions for sampling are sent from the laboratory on application.

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|--|------|
| (16) Supply of water at farm, for total solids, free ammonia, albuminoid ammonia, nitrites, nitrates, hardness, for fitness for domestic use or potability . . . | 12/6 |
| (17) Supply of water at farm, for potability as above, and for proportions of mineral constituents, lead, copper, acidity pH value, action of water on lead (plumbo solvency), action of water on copper . . . | £1 |
| (18) Farm-yard manure, liquid manure, for nitrogen, potash, phosphates, and proportion of other mineral substances | £1 |

MISCELLANEOUS.

- | | |
|---|---------|
| (19) Feeding oils and fats, for composition and quality . . . | 10/- |
| (20) Search for proportion of arsenic in feeding-stuff . . . | 10/- |
| (21) Search for proportion of lead in feeding-stuff . . . | 10/- |
| (22) Search for arsenic or any one poison in feeding-stuff . . . | 10/- |
| (23) Search for proportion of any one poison in viscera . . . | 10/- |
| (24) Search for poisons in food or in viscera, and proportion of poison found | £1 10/- |
- (Veterinary surgeons are not entitled to have searches made for poisons in food or viscera under the Society's scheme for clients who are not members of the Society.)*
- | | |
|--|------|
| (25) Proportion of arsenic in sheep dips or insecticides . . . | 10/- |
| (26) Proportion of carbolic acid in sheep dips or insecticides . . . | 5/- |
| (27) Proportion of tar acids in sheep dips or insecticides . . . | 10/- |
| (28) Insecticides, foot rot pastes and other agricultural remedies for live stock and farm produce . . . | £1 |

Samples should be sent (carriage paid) to Dr J. F. TOCHER, Crown Mansions, 41½ Union Street, Aberdeen.

INSTRUCTIONS FOR SELECTING SAMPLES FOR ANALYSIS.

MANURES.

Any method of sampling mutually agreed upon between buyer and seller may be adopted, but the following method is recommended as a very complete and satisfactory one: Four or more bags should be selected for sampling. Each bag is to be emptied out separately on a clean floor, worked through with the spade, and one spadeful taken out and set aside. The four or more spadefuls thus set aside are to be mixed together until a uniform mixture is obtained. Of this mixture one spadeful is to be taken, spread on paper, and still more thoroughly mixed, any lumps which it may contain being broken down with the hand. Of this mixture two samples of about half a pound each should be taken by the purchaser or his agent, in the presence of the seller or his agent or two witnesses (due notice having been given to the seller of the time and place of sampling), and these samples should be taken as quickly as possible, and put into bottles

or tin cases to prevent loss of moisture, and having been labelled, should be sealed by the samplers—one or more samples to be retained by the purchaser, and one to be sent to the Chemist for analysis.

FEEDING-STUFFS.

Samples of feeding-stuffs which are in the form of meal may be taken in a similar manner to that mentioned above.

Samples of cake should be taken by selecting four or more cakes from the bulk. These should be nudded to a size not larger than walnuts. The nudded cake should then be thoroughly mixed and samples of not less than one pound each taken from it. The samples should be put into bottles or tins, sealed up, and labelled. One sample should be sent to the Chemist, and one or more duplicates retained by the purchaser.

VEGETABLE PRODUCTS.

Turnips, &c., at least 50 bulbs carefully selected as of fair average growth.

Hay, straw, ensilage, &c., should be sampled from a thin section out across the whole stack or silo, and carefully mixed; above 2 lb. weight is required for analysis.

Grain should be sampled like manures.

Grass should be representative of the whole field; about 5 lb. weight is required for analysis.

DAIRY PRODUCE.

Milk.—Samples of milk from individual cows should be taken direct from the milk-pail after complete milking. Average samples from a number of cows should be taken immediately after milking. Specify whether the sample is morning or evening milk, or a mixture of these. Samples to be tested for adulteration should not be drawn from the bottom or taken from the top of standing milk, but they should be ladled from the vessel after the milk has been thoroughly mixed. Samples of milk should be sent immediately to the Chemist.

For most purposes a half-pint bottle of milk is a large enough sample.

Butter.—About quarter-pound samples are required.

WATERS.

When the water is from a well, it should be pumped for some minutes before taking the sample.

If the well has been standing unused for a long time, it should be pumped for some hours, so that the water may be renewed as far as possible.

If the well has been newly dug or cleaned out, it should be pumped as dry as possible, daily, for a week before taking the sample.

Water from cisterns, tanks, ponds, &c., should be sampled by immersing the bottle entirely under the water, and holding it, neck upwards, some inches below the surface. *Water from the surface should not be allowed to enter the bottle.*

Spring or stream water should not be sampled in very wet weather, but when the water is in ordinary condition. Such waters should be sampled by immersing the bottle. If not deep enough for that

purpose, a perfectly clean cup should be used for transferring the water to the bottle.

When the bottle has been filled the stopper should be rinsed in the water before replacing it.

Interference with or disturbance of wells or springs, or the ground in their immediate vicinity, must be carefully avoided during sampling, and for at least twenty-four hours before it.

After a sample has been taken, it should be sent to the Chemist as speedily as possible.

A description of the source and circumstances of the water should accompany the sample, as the interpretation of the analytical results depends to some extent on a knowledge of such particulars.

N.B.—Stone jars and old wine bottles are unsuitable for conveying samples. Winchester quarts chemically cleaned should be obtained from Dr J. F. TOCHER, Crown Mansions, 41½ Union Street, Aberdeen.

COMPOSITION AND CHARACTERISTICS OF MANURES AND FEEDING-STUFFS.

Note on Statutory Statements.

In the Fertilisers and Feeding Stuffs Act, 1926, are included certain schedules which give the definitions implied on the sale of fertilisers and feeding-stuffs under certain names and also the particulars to be contained in the statutory statement which has to be furnished to the purchaser in connection with the sale of a fertiliser or a feeding-stuff. Such statutory statements "shall have effect as a written warranty by the seller that the particulars contained in the statutory statement are correct."

The particulars required vary for different articles and the under-noted are given as examples. Full particulars can be found by reference to the schedules of the Act.

FERTILISERS.

Sulphate of ammonia	Amount of nitrogen and amount of free acid.
Superphosphate	Amount of soluble phosphoric acid.
Potassium salts (potash fertilisers)	Amount of potash.
Compound fertilisers	Amounts of nitrogen, potash, soluble phosphoric acid, and insoluble phosphoric acid, if any, respectively.

FEEDING-STUFFS.

Linseed cakes and the meals of such cakes.	Amounts of oil and albuminoids.
Cotton cakes or meals (not decorticated).	Amounts of oil and albuminoids.
Cotton cakes or meals from decorticated or partly decorticated cotton seed.	Amounts of oil, albuminoids, and fibre.
Compound cakes or meals.	Amounts, if any, of oil, albuminoids, and fibre.

PRICES OF FERTILISERS AND FEEDING-STUFFS— SEASON 1945

(Cash Prices as at 7th February These prices are subject to variation from month to month or oftener)

FERTILISERS

Name of Fertiliser	Guarantee	Price per Ton	Price per Unit
Superphosphate *	18 Sol Phos Acid	£ s d 5 8 6	s d 6 0½
(March June)		5 10 0	6 1½
Triple Superphosphate *	48 Sol Phos Acid	18 17 0	5 9½
(March June)		19 18 6	5 9½
Sulphate of Ammonia (neutral) *	20 6% Nitrogen	10 0 6	9 8½
(March June)		10 2 0	9 9½
Bone Slag * †	12% Total Phos Acid	2 12 6	4 4½
" " †	13% Total Phos Acid	2 15 6	4 3½
" " †	14% Total Phos Acid	2 18 6	4 2½
" " † (Bessemer)	15 3% Total Phos Acid	3 11 6	3 11
Bone Meal (Indian)	{ 4% Nit } { 20% Total Phos Acid }	{ 7 0 0 }	{ N 37 9 TPA 5½ }
Chilean Nitrate of Soda *	16% Nitrogen	10 14 0	13 4½
Chilean Potash Nitrate *	{ 15% } { 15% Potash }	{ 15 15 0 }	{ N 14 0 P 7 0 }
Nitro Chalk *	15 ½% Nitrogen	9 14 0	12 6½
Sulphate of Potash	48 ½% Potash	18 15 0	7 8½
Muriate of Potash	60% "	13 18 0	4 6½

The prices for all fertilisers are cash prices for two ton lots in bags at Leith or Glasgow, unless otherwise stated. Where prices are quoted carriage paid, there is a reduction, in certain cases of from 5/ to 10/ per ton when lifted by Sellers stores

* Carriage paid to any railway station in six ton lots. Four ton lots 2/ more per ton

† The fineness is such that 80% of the powder will pass through the prescribed sieve

‡ The fineness is such that 90% of the powder will pass through the prescribed sieve 85% solubility in citric acid

N B — When these units are multiplied by the percentages in the analysis of a Manure, they will produce a value representing very nearly the cash price per ton at which fertilisers may be bought in fine sowing condition at Leith

Ground Lime, in bags (60% calcium oxide), at Dufftown, 57/8 per ton, (60% calcium oxide), at Shotts 57 10 per ton

English Ground Lime (90% calcium oxide) at Blencow, for 41/10 per ton, or to Aberdeen, 78/9 per ton, (80% calcium oxide), at Blencow, for 40/8 per ton

Ground Limestone (94% calcium carbonate), at Loanhead, 29/ per ton, (90% calcium carbonate), at Wishaw, 39/6 per ton, (85% calcium carbonate), at Grange, 27/ per ton

FEEDING-STUFFS.

Name of Feeding-Stuff.	Price per Ton.
Linseed Cake (Home), 8% Oil, 28% Albuminoids	£ s. d. 11 5 0
„ (Expeller), 9% Oil, 30% Albuminoids*	11 7 6
Cotton Seed Cake (Egyptian) (uncorticated) (home made), 4.5% Oil, 22% Albuminoids	7 17 6
Decorticated Cotton Seed Cake, 48-50% Oil and Albuminoids*	10 2 6
Ground Nut Cake—	
Decorticated, 48-50% Oil and Albuminoids	9 10 0
„ (Expeller), 57-60% Oil and Albuminoids*	9 17 6
Palm Kernel Cake	8 5 0
Rice Bran Meal*	8 5 0
White Bran, straight run	9 17 6
Red Bran, straight run	8 17 6
Dried Grains †	7 7 6
Locust Beans (Kibbled)* †	9 17 6
Maize †	10 0 0
„ (Flaked) †	11 17 6
Home Oats (Feeding)	16 0 0
White Fish Meal, 4% Oil, 64% Albuminoids (at Aberdeen)	23 14 8

All the above are controlled prices and are for one-ton lots direct ex import quay or mill, unless otherwise stated.

* None available at this date.

† Including Bags.

‡ Bags extra.

CLASSIFICATION OF MANURES.

BONE MEALS	{ Genuine Bone Meal contains about 20 per cent Phosphoric Acid equal to 48.7 per cent Tricalcium Phosphate, and about 4 per cent Nitrogen. If Phosphates are low, Nitrogen will be high, and conversely.
MIXTURES AND COMPOUND MANURES	{ To be valued according to the following units: Nitrogen, 9/10; Soluble Phosphoric Acid, 5/4; Insoluble Phosphoric Acid, 8/5; and Potash, 4/11 (from muriate). The value so arrived at will be the value at Leith, exclusive of the cost of mixing, bags and bagging, which may be taken on an average at about 30/- per ton.

INSTRUCTIONS FOR VALUING MANURES.

The unit used for the valuation of manures is the hundredth part of a ton, and as the results of analyses of manures are expressed in parts per hundred, the percentage of any ingredient of a manure when multiplied by the price of the unit of that ingredient represents the value of the quantity of it contained in a ton.

As an example take muriate of potash; a good sample (see p 44) will be guaranteed to contain 60 per cent of oxide of potash. All potash manures are valued according to the amount of potash (oxide of potash) they yield, and muriate of potash yields 60 per cent of potash (K_2O)—i.e., 60 units per ton; and as a ton of muriate of potash costs £13, 13s., the price of the unit is the sixtieth part of that—viz., 4/6 $\frac{1}{2}$. If on analysis a sample of muriate of potash guaranteed to contain 60 per cent of potash is found to contain only 56 per cent, the price per ton will be 18/2 (four times 4/6 $\frac{1}{2}$) less—viz., £12, 14s. 10d.

Similarly with all other manures, the price per unit is derived from the price per ton of a sample of good material up to its guarantee, and

therefore the proper price per ton of a manure is found by multiplying the price of the unit of the valuable ingredient by the percentage as found by analysis. If a manure contains more than one valuable ingredient, the unit value of each ingredient is multiplied by its percentage, and the values so found when added together give approximately the price per ton of the manure.

The commercial values of manures are determined by means of the UNITS in the following manner:—

Take the results of analysis of the manure, and look for the following substances:—

Phosphates dissolved (or soluble phosphoric acid)	} No other items but these are to be valued.
Phosphates undissolved (or insoluble phosphoric acid)	
Total phosphoric acid	
Nitrogen	
Potash	

Should the results of analysis or the guarantee not be expressed in that way, the chemist or the seller should be asked to state the quantities in these terms.

Suppose the manure is a superphosphate. The February price per unit of phosphoric acid in superphosphate (18 per cent grade) is $6/0\frac{1}{2}$, and if a consignment contains 17 per cent soluble phosphoric acid it is valued thus—

Soluble phosphoric acid. 17 times $6/0\frac{1}{2}$, equal to £5, 2s. 4d.

Insoluble phosphoric acid is not valued in a superphosphate.

Suppose the manure is a compound fertiliser containing 6 per cent nitrogen, 8 per cent soluble phosphoric acid, 1 per cent insoluble phosphoric acid, and 5 per cent potash. From the units given on p. 45 for "Mixtures and Compound Manures," the value of this compound fertiliser is obtained as follows:—

The value of the—

Nitrogen will be	£2	19	0	per ton
Soluble phosphoric acid will be .	2	6	4	"
Insoluble phosphoric acid will be .	0	3	5	"
Potash will be	1	4	7	"
	<hr/>			
	£6	13	4	

The value of this manure will thus be £6, 13s. 4d. per ton, exclusive of the cost of mixing, bags and bagging, which may be taken on an average at about 30/- per ton. It will be seen that the potash is valued on the assumption that it is derived from muriate.

Nota.—The units have reference solely to the MARKET PRICES of MANURES, and not to their AGRICULTURAL VALUES

TABLE OF COMPENSATION VALUES FOR 1945.

TABLE SHOWING THE VALUE OF FEEDING-STUFFS AS MANURE PER TON, AND THE COMPENSATION VALUE PER TON OF FOOD CONSUMED, BASED ON THE AVERAGE UNIT PRICES OF FERTILISERS FOR 1945.

The following is a Table showing (under Section A) the average proportions of nitrogen, phosphoric acid, and potash present in the feeding-stuffs named. The Table also shows the value per unit of nitrogen, phosphoric acid, and potash, the prices per unit being the value per unit for compound manures prevailing for 1945. Under Section B of the Table is shown the compensation value per ton of food consumed for each of the feeding-stuffs named, based on the unit prices for 1945. Column (1) of Section B of the Table shows the value per ton recovered in dung; while the remaining two columns show the residual values per ton after one crop and two crops have been removed.

The residual value, after one crop has been removed, is taken as one-half of the original residual value. Residual values, after one crop has been removed, are reduced by one-half after each crop.

Foods.	Nitrogen.		
	Per cent in food.	Value at 9s. 10d. per unit.	Two-fifths value to manure.
	(1)	(2)	(3)
Cotton-cake, decorticated	6.90	s. d. 67 10	s. d. 27 2
Cotton-cake, undecorticated	3.54	34 10	13 11
Linseed cake	4.75	46 9	18 8
Linseed	3.60	35 5	14 2
Soya-bean cake	6.85	67 4	26 11
Palm-nut cake	2.50	24 7	9 10
Cocoa-nut cake	3.40	33 5	13 4
Earth-nut cake	7.62	74 11	30 0
Rape cake	4.90	48 2	19 3
Beans	4.00	39 4	15 9
Peas	3.60	35 5	14 2
Wheat	1.80	17 8	7 1
Barley	1.65	16 3	6 6
Oats	2.00	19 8	7 10
Maize	1.70	16 9	6 8
Rice-meal	1.90	18 8	7 6
Locust beans	1.20	11 10	4 9
Malt	1.70	16 9	6 8
Malt culms	3.90	38 4	15 4
Bran	2.50	24 7	9 10
Brewers' and distillers' grains (dried)	3.30	32 5	13 0
Brewers' and distillers' grains (wet)	0.81	8 0	3 2
Dried distillery dreg	5.31	52 3	20 11
Clover hay	2.24	22 0	8 10
Meadow hay	1.50	14 9	5 11
Wheat straw	0.45	4 5	1 9
Barley straw	0.40	3 11	1 7
Oat straw	0.50	4 11	2 0
Mangolds	0.22	2 2	0 10
Swedes	0.25	2 6	1 0
Turnips	0.18	1 9	0 8
Fish-meal	8.98	88 4	35 4

The figures in column (10) are the

A.						B.		
VALUE PER TON AS MANURE.						COMPENSATION VALUE PER TON OF FOOD CONSUMED.		
Phosphoric Acid.			Potash.			(1) Value re- covered in dung.	Residual Value after	
Per cent in food (4)	Value at 5s. 9d. per unit. (5)	Three- fourths value to manure. (6)	Per cent in food. (7)	Value at 4s. 11d. per unit. (8)	Three- fourths value to manure. (9)	(10)	(2) One crop. (11)	(3) Two crops. (12)
	s. d.	s. d.		s. d.	s. d.	s. d.	s. d.	s. d.
3.10	17 10	13 5	2.00	9 10	7 5	48 0	24 0	12 0
2.00	11 6	8 8	2.00	9 10	7 5	30 0	15 0	7 6
2.00	11 6	8 8	1.40	6 11	5 2	32 6	16 3	8 2
1.54	8 10	6 8	1.37	6 9	5 1	25 11	13 0	6 6
1.30	7 6	5 8	2.20	10 10	8 2	40 9	20 5	10 2
1.20	6 11	5 2	0.50	2 6	1 11	16 11	8 6	4 3
1.40	8 1	6 1	2.00	9 10	7 5	26 10	13 5	6 9
2.00	11 6	8 8	1.50	7 5	5 7	44 3	22 2	11 1
2.50	14 5	10 10	1.50	7 5	5 7	35 8	17 10	8 11
1.10	6 4	4 9	1.30	6 5	4 10	25 4	12 8	6 4
0.85	4 11	3 8	0.96	4 9	3 7	21 5	10 9	5 4
0.85	4 11	3 8	0.53	2 7	1 11	12 8	6 4	3 2
0.75	4 4	3 3	0.55	2 8	2 0	11 9	5 11	2 11
0.60	3 5	2 7	0.50	2 6	1 11	12 4	6 2	3 1
0.60	3 5	2 7	0.37	1 10	1 5	10 8	5 4	2 8
0.60	3 5	2 7	0.37	1 10	1 5	11 6	5 9	2 11
0.80	4 7	3 5	0.80	3 11	2 11	11 1	5 7	2 9
0.80	4 7	3 5	0.60	2 11	2 2	12 3	6 2	3 1
2.00	11 6	8 8	2.00	9 10	7 5	31 5	15 9	7 10
2.70	15 6	11 8	1.45	7 2	5 5	26 11	13 6	6 9
1.61	9 3	6 11	0.20	1 0	0 9	20 8	10 4	5 2
0.42	2 5	1 10	0.05	0 3	0 2	5 2	2 7	1 4
0.44	2 6	1 11	0.22	1 1	0 10	23 8	11 10	5 11
0.57	3 3	2 5	1.50	7 5	5 7	16 10	8 5	4 3
0.40	2 4	1 9	1.60	7 10	5 11	13 7	6 10	3 5
0.24	1 5	1 1	0.80	3 11	2 11	5 9	2 11	1 5
0.18	1 0	0 9	1.00	4 11	3 8	6 0	3 0	1 6
0.24	1 5	1 1	1.00	4 11	3 8	6 9	3 5	1 8
0.07	0 5	0 4	0.40	2 0	1 6	2 8	1 4	0 8
0.06	0 4	0 3	0.22	1 1	0 10	2 1	1 1	0 6
0.05	0 3	0 2	0.30	1 6	1 2	2 0	1 0	0 6
7.24	41 8	31 3	0.50	2 6	1 11	68 6	34 3	17 2

sum of columns (3), (6), and (9).

BOTANICAL DEPARTMENT

Consulting Botanist to the Society—(vacant).

The Society has fixed the following scale of charges for the examination of plants and seeds for the *bona fide* and individual use and information of members of the Society (not being seedsmen), who are particularly requested, when applying to the Consulting Botanist, to mention the kind of examination required, and to quote its number as appearing in the undernoted Scale of Charges. The charge for examination must be paid at the time of application, and the carriage or postage on all parcels must be prepaid.

Scale of Charges for Examinations.

1. A report on the purity, amount, and nature of foreign materials, and the germinating power of a sample of seed . . . 1s.
2. Determination of the species of any weed or other plant, or of any vegetable parasite, with a report on its habits and the means for its extermination or prevention . . . 1s.
3. Report on any disease affecting farm crops . . . 1s.
4. Determination of the species of any natural grass or fodder plant, with a report on its habits and pasture or feeding value . . . 1s.

The Consulting Botanist's Reports are furnished to enable members—purchasers of seeds and corn for agricultural or horticultural purposes—to test the value of what they buy, and are not to be used or made available for advertising or trade purposes by seedsmen or otherwise.

Purchase of Seeds.

The purchaser should obtain from the vendor, by invoice or other writing, the proper designation of the seeds bought, with a guarantee of the percentage of purity and germination, and of its freedom from ergot, and in the case of clover, from the seeds of dodder or broomrape.

It is strongly recommended that the purchase of *prepared mixtures* of seeds should be avoided. The different seeds should be purchased separately and mixed by the farmer: mixtures cannot be tested for germination.

The Sampling of Seeds.

The utmost care should be taken to secure a fair and honest sample. This should be drawn from the bulk delivered to the purchaser, and not from the sample sent by the vendor.

When legal evidence is required, the sample should be taken from the bulk, and placed in a sealed bag in the presence of a witness. Care should be taken that the sample and bulk be not tampered with after delivery, or mixed or brought in contact with any other sample or bulk.

At least one ounce of grass and other small seeds should be sent, and two ounces of cereals and the larger seeds. When the bulk is obviously impure the sample should be at least double the amount specified. Grass seeds should be sent at least four weeks, and seeds of clover and cereals two weeks, before they are to be used.

The exact name under which the sample has been sold and purchased should accompany it.

Reporting the Results.

The Report will be made on a schedule in which the nature and amount of impurities will be stated, and the number of days each sample has been under test, with the percentage of the seeds which have germinated.

"Hard" clover seeds, though not germinating within the time stated, will be considered good seeds, and their percentage separately stated.

The impurities in the sample, including the chaff of the species tested, will be specified in the schedule, and only the percentage of the pure seed of that species will be reported upon; but the REAL VALUE of the sample will be stated. The Real Value is the combined percentages of purity and germination, and is obtained by multiplying these percentages and dividing by 100: thus in a sample of Meadow Fescue having 88 per cent purity and 95 per cent germination, 88 multiplied by 95 gives 8360, and this divided by 100 gives 83·6, the Real Value.

Selecting Specimens of Plants.

The whole plant should be taken up and the earth shaken from the roots. If possible the plants should be in flower or fruit. They must be packed in a light box, or in a firm paper parcel.

Specimens of diseased plants or of parasites should be forwarded as fresh as possible. They must be placed in a bottle, or packed in tinfoil or oil-silk.

All specimens should be accompanied with a letter specifying the nature of the information required, and stating any local circumstances (soil, situation, &c.) which, in the opinion of the sender, would be likely to throw light on the inquiry.

NOTE.—Members are reminded that Seeds may now be tested at the Department of Agriculture for Scotland Seed-testing Station. Samples should be addressed to T. Anderson, Esq. Seed-testing Station, East Craigs, Corstorphine, Edinburgh.

PREMIUMS OFFERED

1945

GROUP I.—REPORTS.

GENERAL REGULATIONS.

1. It is to be distinctly understood that the Society is not responsible for the views, statements, or opinions of any of the writers whose papers are published in the 'Transactions.'

2. All reports must be legibly written, and on one side of the paper only; they must specify the number and subject of the Premium for which they are in competition; they must bear a distinguishing motto, and be accompanied by a sealed letter, similarly marked, containing the name and address of the reporter—initials must not be used.

3. No sealed letter, unless belonging to a report found entitled to the Premium offered, or a portion of it, will be opened without the author's consent.

4. Reports for which a Premium, or a portion of a Premium, has been awarded, become the property of the Society, and cannot be published in whole or in part, or circulated in any manner, without the consent of the Directors. All other papers will be returned to the authors if applied for within twelve months.

5. The Society is not bound to award the whole or any part of a Premium.

6. All reports must be of a practical character, containing the results of the writer's own observation or experiment, and the special conditions attached to each Premium must be strictly fulfilled. General essays, and papers compiled from books, will not be rewarded or accepted. Weights and measurements must be indicated by the imperial standards.

7. The Directors, before or after awarding a Premium, shall have power to require the writer of any report to verify the statements made in it.

8. The decisions of the Board of Directors are final and conclusive as to all matters relating to Premiums, whether for Reports or at General or District Shows; and it shall not be competent to raise any question or appeal touching such decisions before any other tribunal.

9. The Directors will welcome papers from any Contributor on any suitable subject, whether included in the Premium List or not; and if the topic and the treatment of it are both approved, the writer may be remunerated and his paper published.

SECTION 1.—THE SCIENCE AND PRACTICE OF AGRICULTURE.

FOR APPROVED REPORTS.

1. On any useful practice in Rural Economy adopted in other countries, and susceptible of being introduced with advantage into Scotland—The Gold Medal. To be lodged by 1st November in any year.

The purpose chiefly contemplated by the offer of this premium is to induce travellers to notice and record such particular practices as may seem calculated to benefit Scotland. The Report to be founded on personal observation.

2. Approved Reports on other suitable subjects. To be lodged by 1st November in any year.

SECTION 2.—ESTATE IMPROVEMENTS.

FOR APPROVED REPORTS.

1. By the Proprietor in Scotland who shall have executed the most judicious, successful, and extensive Improvement—The Gold Medal, or Ten Pounds. To be lodged by 1st November in any year.

Should the successful Report be written for the Proprietor by his resident factor or farm manager, a Minor Gold Medal will be awarded to the writer in addition to the Gold Medal to the Proprietor.

The merits of the Report will not be determined so much by the mere extent of the improvements, as by their character and relation to the size of the property. The improvements may comprise reclaiming, draining, enclosing, planting, road-making, building, and all other operations proper to landed estates. The period within which the operations may have been conducted is not limited, except that it must not exceed the term of the Reporter's proprietorship.

2. By the Proprietor or Tenant in Scotland who shall have reclaimed within the ten preceding years not less than forty

acres of Waste Land—The Gold Medal, or Ten Pounds. To be lodged by 1st November in any year.

3. By the Tenant in Scotland who shall have reclaimed within the ten preceding years not less than twenty acres of Waste Land—The Gold Medal, or Ten Pounds. To be lodged by 1st November in any year.

4. By the Tenant in Scotland who shall have reclaimed not less than ten acres within a similar period—The Medium Gold Medal, or Five Pounds. To be lodged by 1st November in any year.

The Reports in competition for Nos. 2, 3, and 4 may comprehend such general observations on the improvement of waste lands as the writer's experience may lead him to make, but must refer especially to the lands reclaimed—to the nature of the soil—the previous state and probable value of the subject—the obstacles opposed to its improvement—the details of the various operations—the mode of cultivation adopted—and the produce and value of the crops produced. As the required extent cannot be made up of different patches of land, the improvement must have relation to one subject; it must be of profitable character, and a rotation of crops must have been concluded before the date of the Report. *A detailed statement of the expenditure and return* and a certified measurement of the ground are requisite.

5. By the Proprietor or Tenant in Scotland who shall have improved within the ten preceding years the Pasturage of not less than thirty acres, by means of top-dressing, draining, or otherwise, without tillage, in situations where tillage may be inexpedient—The Gold Medal, or Ten pounds. To be lodged by 1st November in any year.

6. By the Tenant in Scotland who shall have improved not less than ten acres within a similar period—The Minor Gold Medal. To be lodged by 1st November in any year.

Reports in competition for Nos. 5 and 6 must state the particular mode of management adopted, the substances applied, the elevation and nature of the soil, its previous natural products, and the changes produced.

SECTION 3.—HIGHLAND INDUSTRIES

FOR APPROVED REPORTS.

1. The best mode of treating native Wool; cleaning, carding, dyeing, spinning, knitting, and weaving by hand in the Highlands and Islands of Scotland—Five Pounds. To be lodged by 1st November in any year.

SECTION 4.—MACHINERY.

FOR APPROVED REPORTS.

To be lodged by 1st November in any year.

SECTION 5.—FORESTRY.

FOR APPROVED REPORTS.

1. On Plantations of not less than eight years' standing formed on deep peat-bog—The Medium Gold Medal, or Five Pounds. To be lodged by 1st November in any year.

The Premium is strictly applicable to deep peat or flow moss; the condition of the moss previous to planting, as well as at the date of the Report, should, if possible, be stated.

The Report must describe the mode and extent of the drainage, and the effect it has had in subsiding the moss—the trenching, levelling, or other preliminary operations that may have been performed on the surface—the mode of planting—kinds, sizes, and number of trees planted per acre—and their relative progress and value, as compared with plantations of a similar age and description grown on other soils in the vicinity.

GROUP II.—DISTRICT GRANTS.

APPLICATIONS.

Forms of Application may be obtained from the Secretary, 8 Eglinton Crescent, Edinburgh 12, which should be completed and returned on or before **1st November 1945**, in respect of a Grant commencing in the following year.

RENEWAL OF GRANT.—Applications for **renewal** of a particular Grant will be entertained only after the lapse of a specified interval of years (as undernoted) from the termination of the previous Grant, without prejudice, however, to the competency of applying in such intermediate years for a Grant in any other class.

Class.	Interval.
*1. Grants of £12 for Show Premiums for Horses, Cattle, Sheep, and Pigs	4 years.
2. Grants of £15 in respect of Stallions engaged for Agricultural purposes	3 years.
*3. Grants of Silver Medals in aid of Premiums	2 years.
4. Special Grants	—
5. Grants of £10 to Federations of S.W.R.I. for Show or Exhibition Prizes	2 years.

* NOTE.—Grants under Classes 1 and 3 have been suspended for the duration of the War.

CLASS 1.

LOCAL AGRICULTURAL SOCIETIES—GRANTS OF £12 FOR SHOW PREMIUMS FOR HORSES, CATTLE, SHEEP, AND PIGS.

REGULATIONS.—See Volume for 1940 for Regulations and Rules of Competition.

GRANTS SUSPENDED THROUGHOUT THE WAR.—In January 1941 the Directors agreed that it was undesirable for the Society to encourage the holding of Agricultural Shows during the War, and it was decided, accordingly, that all grants by the Society of money and medals in aid of Local Agricultural Shows be suspended throughout the further duration of the War.

The Societies entitled to grants at the end of the War on resumption of their Shows are detailed in the Volume for 1941.

CLASS 2.

HORSE ASSOCIATIONS—GRANTS OF £15 IN RESPECT OF STALLIONS ENGAGED FOR AGRICULTURAL PURPOSES.

REGULATIONS, 1945.

1. The Highland and Agricultural Society will make Grants to Horse Associations and other Societies in different districts engaging Stallions for agricultural purposes. The total sum expended by the Highland and Agricultural Society in such grants shall not exceed the sum of £210 in any one year.

(*Note.*—As a special provision this sum has been raised to £300 for the year 1945.)

2. All applications must be at the instance of a Horse Association. Either the Convener or the Secretary must be a member of the Highland and Agricultural Society of Scotland.

3. *Application of Grant.*—The portion of the Grant to any one Association or Society shall not exceed the sum of £15 in any one year. It is intended that the Grant shall be used by the Association or Society for the purpose of enabling it to secure a better class of Stallion.

4. *Duration of Grant.*—The Grant will continue for three consecutive years.

5. *Registration of Stallions.*—The Grants will be available only for Stallions which, for the years to which the Grants apply, are registered in the Register of Certified Draught Stallions published by the Department of Agriculture for Scotland. (For information regarding the Registration of Stallions, apply to the Secretary of the Department of Agriculture for Scotland, St Andrew's House, Edinburgh.)

6. *Engagement of Stallions.*—In the event of a Horse not being engaged in any one year while the provisions of the Grant are in force, the Grant made by the Highland and Agricultural Society will cease.

7. *Report to be Submitted.*—Forms of Report will be furnished to the Secretaries. Full details, as required, must be given and the completed Reports, duly signed and certified, must be lodged with the Secretary of the Highland and Agricultural Society as soon as possible, and in no case later than 1st November. These Reports are subject to the approval of the Directors of the Highland and Agricultural Society, against whose decision there shall be no appeal. The grant will lapse if no Report is lodged by the due date.

8. *Payment of Grant.*—Grants will be paid in December after the Reports have been received and found to be in order and passed by the Board of Directors.

9. *Renewal of Grant.*—An Association or Society which has received a Grant shall not be eligible to apply for a renewal of the Grant until after the expiry of three years from the termination of the previous Grant. In disposing of applications the Directors of the Highland and Agricultural Society of Scotland shall keep in view the length of interval that has elapsed since making a previous Grant, giving priority to those Associations or Societies which have been longest without a Grant.

Grants in 1945.

3rd and Final Year—GRANT OF £15

1. BRECHIN AND DISTRICT HORSE-BREEDING SOCIETY.
Convener—Andrew N. Guild, Grosefield, Brechin.
Secretary—Frederick A. Ferguson, Solicitor, Brechin.
 Granted 1943.
2. DUMFRIES AND DISTRICT HORSE-BREEDING ASSOCIATION.
Convener—R. Dalziel, Rue, Auldgirth.
Secretary—William J. Will, B.Sc., &c., Acrohead, Dumfries.
 Granted 1943.
3. DUNBLANE, DOUNE, AND CALLANDER HORSE - BREEDING SOCIETY.
Convener—R. W. Fairweather, Estates Office, Blair Drummond, by Stirling.
Secretary—G. Kerr Petrie, Mansfield, Doune.
 Granted 1943.
4. ROSS OF MULL HEAVY HORSE-BREEDING SOCIETY.
Convener—Donald MacDonald, Sheepknowe, Bunessan, Isle of Mull.
Secretary—W. R. MacDougall, Uisgean, Bunessan, Isle of Mull.
 Granted 1943.
5. SLAMANNAN DISTRICT AGRICULTURAL SOCIETY.
Convener—David Dalgleish, Seafeld, Falkirk.
Secretary—Angus A. M'Lean, Duart, Slamannan.
 Granted 1943.

2nd Year—GRANT of £15.

6. SCOTTISH CENTRAL HORSE-BREEDING ASSOCIATION.
Convener—Robert Inglis, Dalachy Farm, Aberdour.
Secretary—Mrs M'Lay, Dunvegan, Causewayhead, Stirling.
 Granted 1944.

1st Year—GRANT of £15.**7. CAITHNESS CLYDESDALE HORSE-BREEDING SOCIETY.***Convener*—Donald Harrold, Lower Roiss, Wick.*Secretary*—John Gowans, Janolstown, Wick.

Granted 1945.

8. CARSE AND DUNDEE DISTRICT STALLION SOCIETY.*Convener*—W. L. Thoms, Midway, Longforgan.*Secretary*—Joseph Murray, Balruddery Farm, Invergowrie.

Granted 1945.

9. DALKEITH AGRICULTURAL SOCIETY.*Convener*—R. H. Watherston, Crichton Mains, Ford, Midlothian.*Secretary*—D. W. Webster, 5 Clifton Terrace, Edinburgh 12.

Granted 1945.

10. KINROSS-SHIRE AGRICULTURAL SOCIETY.*Convener*—Captain R. M. Reid, Tillyrie, Milnathort.*Secretary*—John F. Watson, M.R.C.V.S., Ardmohr, Stirling Road, Milnathort.

Granted 1945.

11. NAIRNSHIRE FARMING SOCIETY.*Convener*—George M. Allan, Auchmacloich, Nairn.*Secretary*—A. J. Mackintosh, St Colns, Auldearn, Nairn.

Granted 1945.

12. SOUTH DEESIDE STOCK IMPROVEMENT SOCIETY.*Convener*—John Pirie, Maryfield, Banchory.*Secretary*—John Duncan, Hall Cottage, Kirkton, Durriss, Drunoeak.

Granted 1945.

CLASS 3.**LOCAL AGRICULTURAL SOCIETIES—GRANTS OF SILVER MEDALS IN AID OF PREMIUMS.**

REGULATIONS.—See Volume for 1940 for Regulations and Rules of Competition.

GRANTS SUSPENDED THROUGHOUT THE WAR.—In January 1941 the Directors agreed that it was undesirable for the Society to encourage the holding of Agricultural Shows during the War, and it was decided, accordingly, that all grants by the Society of money and medals in aid of Local Agricultural Shows be suspended throughout the further duration of the War.

The Societies entitled to grants at the end of the War on resumption of their Shows are detailed in the Volume for 1941.

CLASS 4

SPECIAL GRANTS—1945.

(1) ANNUAL.

1. NORTHERN COUNTIES ARTS AND CRAFTS SOCIETY—£20.
Convener—Miss Mackintosh of Raigmore, Raigmore,
 Inverness.
Joint Secretary—Mrs Mitford, Berryfield, Lentrane, Inverness.
 Granted 1922.
2. SCOTTISH NATIONAL UNION OF ALLOTMENT HOLDERS.
 £15 and 15 Medium Silver Medals to be offered as Prizes
 for best Allotments.
Secretary and Treasurer—Miss H. Thompson, 28 Stafford
 Street, Edinburgh.
 Granted 1927.

GRANTS SUSPENDED.

Various grants have been suspended for the further duration of the War (see reference under Class 1). The Societies, &c., entitled to grants at the end of the War, on resumption of their Shows or Competitions, are detailed in the Volume for 1941.

CLASS 5.

FEDERATIONS OF SCOTTISH WOMEN'S RURAL
INSTITUTES—GRANTS OF £10.

REGULATIONS, 1945.

1. The Highland and Agricultural Society of Scotland will provide annually a sum not exceeding £150 as special Grants to Federations of Scottish Women's Rural Institutes.
2. *Grant to Federation*, £10.—The amount of the Grant to any one Federation shall not exceed the sum of £10 per annum.
3. *Duration of Grant*.—The Grant will continue for two consecutive years.
4. *Disposal of Applications*.—In disposing of applications for Grants, the Directors of the Highland and Agricultural Society shall keep in view the length of interval that has elapsed since the expiration of the last Grant, giving priority to those Federations which have been longest off the list.
5. *Eligibility to Apply*.—All applications must be at the instance of a properly constituted Federation of Institutes.
6. *Application of Grant*.—The Grant of £10 shall not be applied as a Grant-in-aid to the general funds of a Federation, but must be offered in the form of Prizes at any Show or Competition held under the auspices of the Federation.
7. *Announcement of Grant*.—The offer of Prizes must be announced in the Prize List or Catalogue of the Show or Competition as "presented by

the Highland and Agricultural Society of Scotland," or the amount of the Grant must be shown as a separate item of donation in the published statement of Accounts.

8. *Rules of Competition.*—The Rules of Competition for the Prizes, the funds for which are derived from Grants of the Highland and Agricultural Society of Scotland, shall be such as are generally enforced in the case of Prizes offered from the Federation's own funds.

9. *Report to be Submitted.*—Forms of Report will be furnished to the Secretaries of Federations, and these must be completed and returned to the Society as soon as possible after the Show or Competition and in no case later than 1st November. These Reports are subject to the approval of the Directors of the Highland and Agricultural Society, against whose decision there shall be no appeal. All Reports must be signed and certified as marked on the Form.

The Grant will lapse if no Report is lodged.

10. *Payment of Grant.*—Payment of the Grant will be made in December after the Reports of the Awards have been received and found to be in order and passed by the Board of Directors.

11. *Renewal of Grant.*—A Federation which has received a Grant for two consecutive years shall not be eligible to apply for a renewal of the Grant until after the expiry of two years from the termination of the previous Grant.

Grants in 1945.

2nd Year

1. DUMFRIESSHIRE FEDERATION.

Convener—Mrs Graham, Mossknowe, Kirkpatrick-Fleming.

Secretary—Mrs Forrester, Kilness, Dumfries.

Granted 1939. (Grants in abeyance 1940, 1941, 1942, 1943, 1944.)

2. EAST LOTHIAN FEDERATION.

Convener—Mrs Hay, Belton, Dunbar.

Secretary—Mrs M'Kemmie, 2 Wemyss Place, Haddington.

Granted 1938. (Grants in abeyance 1938, 1940, 1941, 1942, 1943, 1944.)

3. MIDLOTHIAN FEDERATION.

Convener—Mrs Mercer, Southfield, Dalkeith.

Secretary—Miss N. Scott Muir, 10 Silverknowes Loan, Davidson's Mains, Edinburgh 4.

Granted 1940. (Grants in abeyance 1940, 1941, 1943, 1944.)

4. MULL, ISLE OF, FEDERATION.

Convener—Mrs Allan of Aros, Tobermory.

Secretary—Mrs Cuninghame, Linnthu, Tobermory.

Granted 1939. (Grants in abeyance 1940, 1941, 1942, 1943, 1944.)

5. ROSS-SHIRE FEDERATION.

Convener—Mrs Ross, East House, Portmahomack, Ross-shire.

Secretary—Miss Margaret Rose, Inchrorie, Strathpeffer.

Granted 1939. (Grants in abeyance 1940, 1941, 1942, 1943, 1944.)

GROUP III.—COTTAGES AND GARDENS, &c.**CLASS 6.**

**LOCAL SOCIETIES, &c.—GRANTS FOR BEST-KEPT
COTTAGES AND GARDENS.**

CLASS 7.

**LOCAL SOCIETIES, &c.—GRANTS OF MINOR SILVER
MEDALS FOR BEST-KEPT COTTAGES AND GARDENS,
GARDEN PRODUCE. POULTRY, AND HONEY.**

REGULATIONS.—See Volume for 1941 for Regulations and Rules of Competition.

GRANTS.—None of the Societies listed in 1941 held a Competition in that year. In the event of any Society holding a Competition in 1945, the respective grants will be made available, as detailed in the Volume for 1941.

**GROUP IV.—PLOUGHING, HOEING, AND
LONG FARM SERVICE.****1. MEDALS FOR PLOUGHING COMPETITIONS.**

The Ploughing Medal will be given to the winner of the first Premium at Ploughing Competitions, provided a Report in the following terms on the official form is made to the Secretary, within one month of the Competition, by a Member of the Society. Forms of Report to be had on application.

NOTE.—*Tractor Ploughing Competitions.*—These Competitions referred originally to Horse Ploughing Matches. As from 1914 the Medal also became available for Tractor Ploughing Competitions, to which Rules 1-7 shall apply.

FORM OF REPORT.

I, _____ of _____, Member of the Highland and Agricultural Society, hereby certify that I attended the Ploughing Match of the _____ Association at _____ in the county of _____ on the _____ when _____ ploughs competed; _____ of land were assigned to each, and _____ hours were allowed for the execution of the work. The sum of £ _____ was awarded as follows:—

[Here enumerate the names and designations of successful Competitors.]

RULES OF COMPETITION.

1. All Matches must be at the instance of a Local Society or Ploughing Association, and no Match at the instance of an individual, or confined to the tenants of one estate, will be recognised.

2. The title of such Society or Association, together with the name and address of its Secretary, must be registered with the Secretary of the Highland and Agricultural Society of Scotland, 8 Eglinton Crescent, Edinburgh.

3. Not more than one Match in the same season can take place within the bounds of the same Society or Association.

4. All reports must be lodged within one month of the date of the Match, and certified by a Member of the Highland and Agricultural Society who was present at it.

5. A Member can report only one Match; and a Ploughman cannot carry more than three Medals in the same season.

6. To warrant the grant of the Medal, there must have been 12 Ploughs in actual competition for the medal (*i.e., in the particular class for which the medal was offered*) and not less than £3 awarded in Prizes by the Local Society. The Medal to be given to the winner of the first prize.

7. The Local Society or Ploughing Association shall decide what class of ploughs shall compete for the Medal, and if so agreed, may offer it for competition to the class of plough most generally in use in the district.

8. The Local Society or Committee may, if they desire, arrange to let each Ploughman have one person to guide the horses for the first two and the last two furrows, but in no case shall Ploughmen receive any other assistance, and their work must not be set up or touched by others. Attention should be given to the firmness and sufficiency of the work below, more than to its neatness above the surface.

9. The Local Committee is required to fix the time to be allowed for ploughing the portion of land, and they are recommended that the time be at the rate of not more than fourteen hours per imperial acre on light land, and eighteen hours on heavy or stony land.

NOTE.—The attention of the Directors of the Society has frequently been drawn to certain irregularities which have occurred in connection with the conduct of Ploughing Matches and the completion of the Reports thereon. Complaints have been made (a) that the allotted amount of ground has not been ploughed, within the specified time, by the competitor awarded the first prize; (b) that the Report sent to this Society has been signed by a Member of the Society who was not present at the Match. It has to be pointed out that any infringement of the above Rules by a Local Society or Ploughing Association will render that Society or Association liable, at the discretion of the Board of Directors, to be debarred from receiving the Society's Medals.

2. MEDALS FOR HOEING COMPETITIONS.

The Minor Silver Medal will be given to the winner of the first Premium at Hoeing Competitions, provided a Report on the official form is made to the Secretary within a month of the Competition by a Member of the Society. Forms of Report to be had on application.

RULES OF COMPETITION.

1. All Matches must be at the instance of a Local Society or Hoeing Association, and no Match at the instance of an individual, or confined to the tenants of one estate, will be recognised.

2. The title of such Society or Association, together with the name and address of its Secretary, must be registered with the Secretary of the Highland and Agricultural Society of Scotland, 8 Eglinton Crescent, Edinburgh.

3. Not more than one Match in the same season can take place within the bounds of the same Society or Association.

4. All reports must be lodged within one month of the date of the Match, and certified by a Member of the Highland and Agricultural Society who was present at it.

5. A Member can only report one Match; and same Competitor cannot carry more than three Medals in the same season.

6. To warrant the grant of the Medal there must have been twelve hoes in Competition, and not less than Three Pounds awarded in prizes by the Local Society or Association. The Medal to be given to the winner of the first prize.

7. The time to be allowed to be decided by the local Committee, but in no case to exceed two hours for two drills of 100 yards each, the third drill being unoccupied, so that Competitors do not interfere with their neighbour's work.

8. Competitors must finish their work as they go along—no turning back or after-dressing allowed. Hand-picking or transplanting shall be strictly prohibited.

9. A Committee shall be appointed to watch the work, and any Competitor found transplanting or otherwise not complying with the Rules shall have his number withdrawn, and be debarred from receiving any prize which might otherwise have been awarded to him.

NOTE.—Medals will be awarded under similar conditions for Competitions in hand-singling.

3. CERTIFICATES AND MEDALS FOR LONG FARM SERVICE.

Certificates and Silver Medals for long service will be awarded by the Society to farm servants, male or female, having an approved service in Scotland of not less than thirty years (not necessarily continuous) —(a) with one employer on the same or different holdings; (b) on the same holding with different employers.

Special Certificates and Gold Medals are also awarded to farm servants, male or female, having an approved service in Scotland of not less than forty-five years (not necessarily continuous), on similar conditions of employment as the above. (*Note.*—The issue of Gold Medals was temporarily suspended for the duration of the War, and until supplies of gold are again made available.)

Forms of Application are obtainable from the Secretary, 8 Eglinton Crescent, Edinburgh.

War Service to count towards the time required for qualification, where farm servants have returned to same service or employment with same farmer or his family.

The award is strictly confined to **Farm** workers, such as Ploughmen, Cattlemen, and Shepherds.

Domestic and House Servants and Estate workers, such as Foresters, Carters, Grooms, &c., are not eligible.

Awards in 1944.

The following received the Special Certificate (Gold Medal temporarily suspended) for service of forty-five years and over :—

Aird, David B., Shieldyards, Annbank.
 Brookie, Robert, North Lodge, Torwoodlee.
 Burnside, George S., 55 Lothian Street, Bonnyrigg.
 Cameron, Donald, Invermallie, Achnacarry.
 Cameron, Samuel, Invermallie, Achnacarry.
 Campbell, Katherine, Whinniomuir, Perth.
 Laidlaw, John, Cessford, Kelso.
 Laing, James W., Thirlestane, Lauder.
 MacDonald, Adam, Annat, Corpach.
 M'Intyre, Robert, Corf House, Taynult.
 Muir, Robert, Rutherford-Burnside, Roxburgh.
 Reid, James, Cessford, Kelso.
 Reid, Thomas, Marlefield, Roxburgh.
 Stewart, Angus, Glendessary, Achnacarry.

The following received the Silver Medal and Certificate for service of from thirty to forty-four years :—

Adams, Peter, Barlinton, Kirkcowan.
 Allan, William, Middlestots, Duns.
 Arres, William, Upper Nisbot, Ancrum.
 Beattie, George, Blinkbonny, Newcastleton.
 Blyth, James T., Brickwork, Broomhall.
 Brown, Peter, Kinaldy, St Andrews.
 Buchanan, James, North Glen, Langbank.
 Cairney, James, Low Drummorie, Stranraer.
 Cairney, Mrs M. A., Low Drummorie, Stranraer.
 Cameron, Donald, Invermallie, Achnacarry.
 Cameron, John, Achnanellan, Glenboig.
 Cameron, Samuel, Invermallie, Achnacarry.
 Campbell, Duncan, Falfield, Cupar.
 Currie, William, South Lodge, Ballindalloch.
 Dick, William, Easter Cadder, Kirkintilloch.

Edgar, A. G., Craigbeck, Moffat.
Gibson, George, Rosskeen, Invergordon.
Graham, James, Mains of Dhuloch, Stranraer.
Graham, John, Logan Mains, Port Logan.
Hay, James, Pitkennie, Auchtertool.
Hogg, John, Cramalt, Cappercleuch.
Hume, John L., Mellerstain, Gordon.
Hume, Peter, Mellerstain, Gordon.
Kerr, Charles, Eassie Mill, Glamis.
Kerr, Robert, Knowetop Cotts, East Hallside.
Laidlaw, John, Cessford, Kelso.
Laidlaw, William, Fairnington, Roxburgh.
M'Colm, James, Killumpha, Port Logan.
M'Colm, Mary, Killumpha, Port Logan.
M'Colm, Robina, Killumpha, Port Logan.
MacDonald, Adam, Annat, Corpach.
MacDonald, Hugh, Craigbeg, Tulloch.
M'Donald, John, Brims Mains, Thurso.
M'Guffog, William, Auchabreck, Port Logan.
M'Intyre, Robert, Corf House, Taynult.
Mackenzie, Murdo, Corriemulzie, Oyckell.
M'Kinnon, Archibald, Cleonigart, Bellochantuy.
M'Minn, William, Beckhead Cott, Winterseugh.
M'Neish, Walter, Newton, Moffat.
M'Queen, David B., Rosefield Farm, Balbeggie.
M'William, David, High Clachan, Castle-Douglas.
Marquis, John, Clifton, Tyndrum.
Milwain, Peter, The Laundry, Shennanton.
Mudie, Andrew, Smithycroft, Hamilton.
Murdoch, William E., Haughs, Turriff.
Nelson, William S., Bogend, Duns.
O'Haire, James, Beoch, Stranraer.
Ramsay, Peter, D'Arcy, Dalkeith.
Reid, James, Cessford, Kelso.
Renton, John, Ploughlands, Maxton, St Boswells.
Robertson, James M., Arngask, Glenfarg.
Stewart, Angus, Glendessary, Achnacarry.
Thomson, Hugh G., Cessford, Kelso.
Tinline, George, Nottylees, Kelso.
Turnbull, Thomas, Hawthornside, Hawick.
Watt, John, Inveravon, Polmont.
Wight, John, Cessford, Kelso.

MEMBERS ADMITTED SINCE THE LIST WAS PUBLISHED IN APRIL 1945.

ARRANGED ACCORDING TO SHOW DISTRICTS.

(ELECTED 6TH JUNE 1945)

1.—GLASGOW DIVISION

ARGYLL

Admitted

1945 Mu Sprian, Peter, Little Dalnoch,
Campbeltown

AYR

1945 Brown, Henry, C.A. (of Messrs
M Lichlan & Brown), 5 Dulc Street,
Kilmarnock

1945 Kerr, John Alexander, Woodhead Farm
Newmilns

1945 Young John West Doura, Kilwinning

1945 Young, Mrs Marion L., West Doura,
Kilwinning

LANARK

1945 Allison, Alexander, 51 Townhead Street,
Hamilton

1945 Hamilton, Matthew, Woolfords, Col
bushaw

1945 Hodge, Niall Dingwall, Bankhead
Farm, Coatbridge

1945 Montgomery, Adam Wilson, jun.,
Westburn Farm, Cambuslang

1945 Montgomery John S., Glen Craig, Well
shot Drive, Cambuslang

1945 Montgomery Robert, 24 Elm Row,
Burnside, near Glasgow

1945 Paterson John M., 1 Arnold Avenue,
Bishopbriggs

1945 Robb, George James Leniant, Fleming-
ton Farm, Cambuslang

1945 Turpie James, Bailie's Causeway,
Hamilton

1945 Young Dr Stephen, 6 Woodside Place,
Glasgow, C 3

RENFREW

1945 Jack, Ian C., B.Sc., Ph.D., 25 Penrith
Avenue, Giffnock

2 —PERTH DIVISION

ANGUS

(PERTH SHOW DISTRICT)

1945 Baxter, Arthur G., Northern Agricultural
Machinery & Lumber Co. Ltd., Stannington,
Dundee

1945 Robertson, David, Farm Manager, 1 Oak
Farm, 19 Loches Road, Dundee

FIFE

1945 Sloan, Thomas, Knockhouse, Crossford,
Dunfermline

PERTH

(PERTH SHOW DISTRICT)

1945 Carslaw R. M. Grogan, Henhill, For
fever

1945 Duncan Thomas, Solicitor, 8
Kenneth Street, Perth

1945 Fraser Harold de, Inchrya House,
Glencarse

3 —STIRLING DIVISION

DUMBARTON

1945 Hay, Mrs David, Carrickstone Farm,
Cumbernauld

1945 McGregor, James, Badshalloch Farm,
Gartacharn by Alexandria

PERTH

(STIRLING SHOW DISTRICT)

1945 Borland Mrs Ena Middleton, Kin-
cardine Castle, Auchterarder

1945 Campbell Colquhoun, Laurence, Ballag
Gieff
1945 Dixon, Major Alastair M, Ledcameroch,
Dunblane
1945 Dixon, Mrs. Alastair, Ledcameroch,
Dunblane
1945 Dixon, Andrew S, Ledcameroch,
Dunblane

STIRLING

1915 Bullions, William, Hilton of Cowie, by
Stirling
1945 Fairley, Harry, Broomage Farm,
Lubert
1945 Fairley Harry, jun, Broomage Farm,
Lubert
1945 Verel, James, Hallquarter, near
Stirling

4—EDINBURGH DIVISION**EAST LoTHIAN**

1945 Lowe, David, Burnside, Precloupan
1945 Miller, James B, Dolphingstone,
Tianent

MID-LoTHIAN

1945 Borthwick, Brigadier-General F. H,
C M G, D S O, Maridene, Ford
1945 Hamilton, Hugh H, Cairns, Kirk-
newton

6.—DUMFRIES DIVISION**DUMFRIES**

1945 Beattie, J, Westerhill, Main, Lang-
holm
1945 Fleming, Thomas Brownlee, M R O V S,
5 Charnwood Road, Dumfries

KIRKCUDBRIGHT

1945 Daly, Donald C, Conniston, Kirk
gunzeon, by Dumfries
1945 Picken, David L, Bromoie, Kirkcud-
bright
1945 Picken, Kerr W, Auchenslad, Auchen-
curn, Castle-Douglas

-INVERNESS DIVISION**INVERNESS**

1945 Jackson, W R, Killichuntly, Kingussie

ROSS AND CROMARTY

1945 Campbell, Colin, blind House, Glen
shiel, Kyle
1945 Gordon, William O, Bindal, Port-
mlomack

MORAY

1945 James, William, Gringreen, Forres
1945 Kirkland, Stirling C, Band of Scotland
Brinch, Forres
1945 McKenzie, Pit J F, High Street,
Forres

SUTHERLAND

1945 Midwood, Ralph, Syre, Strathnaver,
Kinbrace

8.—BORDER DIVISION**EMBRACING THE**

COUNTIES OF BERWICK (INCLUDING THE TOWN OF BERWICK-UPON-
TWEED), PEEBLES, ROXBURGH, AND SELKIRK

BERWICK

1945 Kitchin, W R Hircuskill, Duns
1945 Wagh, Robert Graham (Ministry of
Agriculture & Fisheries), Hotel
Waterloo, Berwick-on-Tweed

PEEBLES

1945 McCallum, James W, Castlehill,
Manor, Peebles

ENGLAND AND WALES

1945 Carr, George P, 6 Lavender Gardens,
Gateshead 9, Co Durham

1945 Drummond, Miss Jean M Mackay,
Carleton Hill, Carlisle

Highland and Agricultural Society of Scotland

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OF

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1945

CONTRACTIONS USED.

D.O.A.S.—Department of Agriculture for Scotland.

N.D.A.—National Diploma in Agriculture.

N.D.D.—National Diploma in Dairying.

N.F.U. & C. of A.S.—National Farmers' Union and Chamber of Agriculture of Scotland.

N.P.B.A.—National Pig Breeders' Association.

S.A.O.S.—Scottish Agricultural Organisation Society.

S.S.P.C.A.—Scottish Society for the Prevention of Cruelty to Animals.

S.W.R.I. —Scottish Women's Rural Institutes.

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AND

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DINWIDDIE'S CULTIVATION RECORD

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Specimen page below.

DINWIDDIE'S
CULTIVATION RECORD

YEAR	FIELD <small>No. or Name and Acres</small>	CROP				TREATMENT		HARVESTING	YIELD	REMARKS
		NATURE	Area <small>of Field</small>	Area <small>of Seed</small>	Quantity <small>T T C</small>	DESCRIPTION	Date of Appl. notes			
1940	1000	Oats	5				1st		20	
	2300					1st	Aug 10	2nd		Good crop - well got
1941	1000	Turnips	100	May 2		Drained on stubble	Nov 10			
					5	1st	Nov 10		100	Eaten by sheep
	1200	Potatoes	23	1st 15		Drained on stubble	Nov 10		9	
					2	1st	Nov 10			
1942	2300	Wheat	12	1st 15		1st	1st 15	2nd	22	Some "light"
					1st	1st 15	1st 15	2nd	22	Well harvested
		Barley	35	1st 15		1st	1st 15	2nd	22	Wheat started by fungus
					1st	1st 15	1st 15	2nd	22	
1943		Hay				1st	1st 15	2nd	22	
						1st	1st 15	2nd	22	
1944		Barley				1st	1st 15	2nd	22	For catch of "clover"
						1st	1st 15	2nd	22	Drained well
1945		Barley				1st	1st 15	2nd	22	Draining improved
						1st	1st 15	2nd	22	Barley more abundant

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